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ECONOMIC AFFAIRS

EKO: ECONOMICS AND ORGANIZATION
OF INDUSTRIAL PRODUCTION

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NEW MANAGEMENT CONDITIONS REVIEWED

Novosibirsk EKONOMIKA I ORGANIZATSIIA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 5, May 86 pp 3-20

[Article by P. G. Bunich, corresponding member of the USSR Academy of Sciences (Moscow): "New Management Conditions: Achievements, Problems, Prospects"]

[Text] The 24th Party Congress orients us toward a significant acceleration of growth rates and a new level of quality. In the next 15 years the country's national income will almost double. This will take place because of a 2.3-2.5-fold increase in the productivity of public labor. This growth will become possible on the basis of doubling the production potential in a qualitatively new, reconstructed form.

But who determines these positive changes? Man, who represents the only creative and active force. In turn, inseparably linked to man are the satisfaction of his needs and interests and the system of incentives that correspond to our time--material, creative and moral. This system realizes economic laws and objective requirements of the economic mechanism. Thus the achievement of new goals presupposes a changeover to adequate methods of work. These are the Archimedian lever for accelerating the country's socioeconomic development. Without radical improvement in these methods it will be impossible to reach the earmarked heights. At the April (1985) Plenum of the CPSU Central Committee it was noted: "Regardless of which issue we may consider, from which side we approach the economy, in the final analysis everything depends on the need for serious improvement of management and the economic mechanism as a whole."¹

A step in the direction of the new mechanism was the large-scale experiment that has been conducted since 1984 in five ministries and since 1985 in 20 more. The experiment encompassed 2,300 enterprises that produce 12 percent of the industrial output. Since 1986 one-third of the industrial enterprises, which produce more than 50 percent of the products, have been operating under the new conditions. This is no longer an experiment, but mass practice. Beginning in 1987 it will include all industrial enterprises. During 1986-1990 the new methods of management will encompass all branches of the economy.

The measures which form the new conditions can be divided into three groups:

principal qualitative changes;

quantitative ensurance of new quality, the desire to bring incentives up to the point where they will be appreciable;

the creation of a favorable external environment.

Taking into account the great importance of the experiment that has been conducted in order to spread it to other areas of industry and branches, it is important to have a comprehensive and objective analysis of the experience that has been accumulated and to reveal results that will be manifested in the future, unsolved problems and possible approaches to resolving them. Let us consider the essence of the innovation in the cross-section of the aforementioned groups and their realization in practice.

Oriented Toward the Future

The evaluation of the activity of collectives not participating in the experiment is done according to the percentage of fulfillment of the plan and its difficulty is not taken into account. All attempts to calculate this and relate it to incentives have turned out to be unsuccessful. Under these conditions the best enterprises are considered to be those that are achieving the lowest plans according to results (output of items, their quality and profit) and the highest according to expenditures (production cost, capital investments, circulating capital). The expenditures sometimes even exceed the results. But if such proportions are envisioned by the plan the collectives do not suffer. The worst enterprises exist at the expense of the best and they eat up the national income instead of creating it. Moreover, per unit of difficulty of work and simple labor the backward collectives are paid better than those whose effect exceeds the expenditures.

This creates a tendency toward adopting plans that do not sufficiently mobilize them. In order to counteract this the state uses the practice of planning from the level that has been achieved, forcing them to work in the future at least as well as they have in the past. What does this method produce? The collectives respond to it with a modest overfulfillment of plans which create an easier base for the next assignment. This method is not irreproachable for another reason as well: it is based on the past and not the future.

In the final analysis the economic indicators change insignificantly. At the same time the plans are more or less fulfilled, creating the illusion of well-being. Let us take the data for 11 months of 1985 which are considered to be relatively successful. The plan for product sales by the Ministry of the Coal Industry was overfulfilled (100.7 percent). At the same time the increase in the volume of production as compared to the corresponding period of the past year was only 2 percent. The Ministry of Light Industry fulfilled the plan by 100.2 percent with an even smaller increase in production of 1 percent.

Incentives for Better Quality

According to the new conditions for management the increase in wage funds depends on the increases in the normative net output (commodity output), and the increase in the incentive funds--on the increases in profit (reduction of production cost) and labor productivity. The normatives of increase in one indicator for an increase in another, as a rule, are the same for the branches or even for groups of branches. Therefore they have ceased to be an object of compromise between the enterprises and the higher agencies. There is only one way left to earn more--to produce more, preliminarily more than was planned (otherwise one cannot find batching items, materials, consumers and so forth) and not to bargain for an advantageous normative. The collectives that have ended up in the best position are those with large increases in production, profit and so forth, and not those that have formally fulfilled reduced assignments. If direct incentives for the plan have frequently provided motivation only to reduce it, incentives for the level of effectiveness, in this case for its partial expression through the increase in production, profit and so forth internally contain an incentive to adopt a more difficult plan. The indirect route turned out to be shorter than the direct one. A step toward evaluating collectives for the result also means a principal innovation of the new mechanism. This increases the interest of all workers in the major factors of effectiveness--economizing on resources, improving and updating output, and providing for scientific and technical progress.

A good high-quality system works only when it relies on the optimal quantitative parameters and does not allow either low or high economic "pressure." To this end it has been established that engineering and technical personnel can earn additionally up to 0.5 salaries, the maximum increments for workers for high qualifications have been increased from 12 to 24 percent of the wage rate, and so forth. Among the other examples of "ensuring quality with quantity" are the increased stimuli for fulfilling agreements, sanctions for underfulfillment have become more reactive, time periods for the payment of bank credit granted to the enterprises have been increased. When the basic planning indicators have not been met the banks can increase the interest on the credit to 20 percent. For late payment on credit increased interests are demanded.

Other important improvements have also been made. Thus if enterprises and production associations of machine-building ministries participating in the experiment which are being constructed or reconstructed do not have funds to pay for equipment, machines and instruments, they can be granted credit with a guarantee from the higher agencies of the USSR Stroybank and the USSR Gosbank.

Favorable External Conditions

If the new forms of management were universal an adequate environment would take form of its own accord. But so far the improved policy is local and therefore it has not fully encompassed all of the partners. Moreover, the new mechanism cannot be included in an official capacity in the old situation. Thus the interest in adopting more difficult plans cannot be sufficiently realized without providing for additional deliveries of raw material, improving its quality and so forth. In order to reveal all of the potential

of the new methods, the first enterprises that changed over to them were granted advantages when planning supply and during the course of fulfillment of the plan and they were given privileges in the provision of transportation. In order for old debts not to weigh down the new "ship," a number of enterprises were given later deadlines for paying them off and were given as much circulating capital as they needed. This makes it possible to answer the question of what the system is capable of if all the obstacles are removed from its path.

Sometimes people say that all of the achievements are determined by the favorable external conditions. This is wrong. Certain other consumers also have priorities (regions of the Far North, construction projects of the food industry, a number of agricultural facilities and so forth). But their results are not as good. The improved results of the innovation ensue from the culmination of benefits and new planning and economic levers. The only thing required under these conditions to provide for purity of the analysis of the results is to grant similar advantages to control enterprises (that is, enterprises outside the new conditions with which the results achieved by the participants in the innovation are compared). This, unfortunately, has not been done yet.

A Couple of Results of the Experiment

When the experiment was transformed into a new system of management, administrative "tuning" of the partners to the new "airwave" became impossible. It was impossible to create advantages for all of them. But there arose a fundamental possibility of better "tuning"--general interest and replacing the effect of the part with the effect of the whole. In this sense the development of new methods in breadth means not only extensive dissemination of them and expansion of the arena (which is important in and of itself), but also intensification of the activity of each collective, a kind of deepening of experience. The only thing that was important was for the potential of the new conditions to be embodied in reality and for there not to be even a temporary overfall between the action of administrative privileges and the stimuli of the system as a whole. So far, unfortunately, the former factors are disappearing more rapidly than the latter are arriving.

Taking these preliminary remarks into account, let us consider certain results from working in the new way. They are characterized primarily by an increase in the growth rates of the normative net output which turned out to be higher for the participants in the innovation than for industry as a whole and of the preceding achievements of collectives that were functioning according to a better management system. Since the normative net output "ignores" past labor, the utilization of this indicator is more progressive than the gross output, commodity output or sold output. It gives a "purer" evaluation of the actual activity of the collectives and it reduces interest in increasing outside labor. The expression of this process was the fact that the volume of normative net output increased more rapidly than commodity output, and the output of material-intensive items became more moderate. It would hardly be justified, however, for the normative net output to ignore the savings or overexpenditure of past labor which, although it does not labor itself, characterizes its effectiveness. Therefore it is crucial to change over from

normative net output to a more "finely tuned" indicator--the actual net output, or simply the net output, the application of which, one must assume, produces a greater interest in saving on past labor than the normative net output does. At a number of industrial enterprises this indicator was already being tried. It would seem that if desired the difficulties in operational accounting for material expenditures and their prompt and rapid deduction from earnings so as to calculate the actual net output can be overcome. This indicator of net output will replace the normative net output. This will mean a step forward. It is impossible to coordinate with this the changeover of certain branches of industry from the normative net output to the commodity output, which is a step backward.

It is especially significant that the increases were achieved with a simultaneous increase in the effectiveness of production which is characterized by an increase in profit (reduction of production cost). The increase in profit was brought about by savings on the production cost, the increased volume of normative net output, the better observance of agreements and the reduction of the fines that were paid. The proportional expenditures were reduced because of the increase in the volume of production, the savings on personnel and payment for workers, some of which were transferred into the material incentives funds, the utilization of the production cost as a fund-forming indicator, funds for the development of production, and so forth.

Since the volumes of normative net output were achieved with the same or a smaller number of workers, labor productivity increased. Enterprises of all ministries have achieved an increase in production just as a result of increasing labor productivity, and the average registered number of industrial production personnel has decreased in a number of ministries even in terms of the absolute amount.

As a result of increasing the normative net output, improving the supply and reducing idle time of labor force, increments to prices, increasing incentive funds for 100 percent fulfillment of agreements, increased increments and payments, the incomes of the workers have increased.

The strengthening of contractual discipline is singled out as one of the positive results of the experiment. During 9 months of 1985 contractual commitments were fulfilled completely by ministries of light industry of the Belorussian and Lithuanian SSR's, of the food industry in the Ukrainian, Azerbaijan, Latvian and Estonian SSR's, of the meat and dairy industry of the Belorussian SSR, and of local industry of the Lithuanian SSR.

But the results that have been achieved are far from the desired ones. Today's indicators have been achieved as a result of relatively complete utilization of external factors (supply, attention, strengthening of discipline) with an inadequate inclusion of the major motive forces. Therefore only the superficial layers of additional effectiveness has been utilized, and the basic reserves have not been used. Among them is a principally new level of labor productivity on the basis of radical acceleration of scientific and technical progress, and the highest product quality, which has now become a primary task. The steps that have been taken have not led to a qualitative change.

What Has Impeded More Rapid Movement?

The increase incentive represents progress as compared to the incentive for the "plan," but it has three major contradictions inherent in it. The first is that interest in increases is stimulated by a relatively small proportion of the result. The wage fund, for example, increases annually by 1.5-2 percent, and the material incentive fund--by 3-5 percent. The base wage funds and incentive funds which account for an overwhelming proportion of the total payment for labor are practically guaranteed (as long as they do not work any worse than they have in past years). Thus the enterprises are faced with an unequal choice: either work hard on increases and earn relatively less or earn less than usual but make up for it with additional pay. It sometimes happens that the second variant is preferable. It would be eliminated if the collectives each year earned not only increases in wages and incentives, and these funds would be in the full amount if they were economically impelled each time to start from the beginning to fight for any ruble of remuneration.

The second contradiction of increase incentives is that the initial conditions vary for various enterprises. Some of them have many unutilized capacities, the norms for the expenditure of raw material have been greatly increased, the norms for output have been decreased and the initial number of workers has been increased. Rapid increases are easy for them. Other enterprises are using all of their capacities. They are optimal in terms of sizes and they are at the modern technical level. These capacities are not in need of reconstruction and expansion, and so they cannot produce increases. At the leading enterprises the norms for the expenditure of raw material are lower, and labor productivity is higher, sometimes 3-4-fold. Rapid increases are relatively less possible for them.

Within the framework of the increase incentives the first group of enterprises, the largest one, has leapt forward in effectiveness and wages. Even now individual enterprises of this group have increased the incomes of workers by 30 rubles a month. Even so in terms of productivity they are still lagging behind the leading collectives at the beginning by 2-4 years in development. When the worst collectives catch up with the best ones with respect to the quality of their work, then the wages of the former backward ones will be almost 25-35 percent more. This does not correspond to the requirements for distribution according to the results of labor and can cause excessive movements of labor force. In order not to allow such distortions it is necessary to change over from increased normatives of incentives to normatives for the formation of the entire wage fund from the actual net output and normatives for the formation of the incentive fund from net profit (profit minus bank interest, rent and fixed payments, payments for funds, normative deductions into the state budget, fines paid with the addition of deductions received for higher economic units). The greater the net output and net profit of the enterprise, the more their wages will be, even though current increases may be moderate. But if the increases are great and the total achievements are small, these collectives will justifiably earn less.

To the extent that some of the enterprises have initial conditions that are objective worse or better than the socially necessary ones, their incentives

for unit normatives from the net output and net profit make some of them "guilty without a crime" and unjustifiably reward others. The solution is to permit certain enterprises to apply temporarily to unit normatives coefficients that increase or reduce them. This measure should affect those whose subjective characteristics diverge sharply from the prevailing ones.

The third contradiction in increase incentives is their inapplicability to some of the enterprises. For the national economy as a whole increased production is necessary, but in a number of cases it is inexpedient. In places where the optimal amounts of output have been achieved; in the extraction of certain resources that involve excessive increase in expenditures and exhaustion of deposits. There are products the demand for which is satisfied or is decreasing. A changeover to a new specialization, like a significant improvement in the quality of items, requires time. Under these conditions it is better to replace the orientation toward increases with an orientation toward maintaining high effectiveness. Attention should also be given to this consideration. If the increases are impossible or inexpedient or if, moreover, a decline is objectively observed, this does not at all preclude a reduction of the number of workers on the basis of the normative net output. But as soon as their number decreases, even with a decline in production it is possible to increase the incomes per worker. This will make it possible to provide normal incentives for collectives where increase in the production of profit and so forth cannot take place.

Incentives for "increases" also bring about more particular problems. Thus in the initial stages of the creation of new capacities or the updating of the assortment "increases" can make it impossible for the collectives to form the necessary wage funds. In order to resolve this contradiction the construction of new enterprises and facilities is provided with wages regardless of "increases." Thus the contradiction is eased, but it is not eliminated. The wage fund is not compensated for by temporary "anti-increases," brought about by reconstruction, modernization or changes in the products list. If one traces and encourages each such change, the system of exceptions becomes the system of rules--weighty and largely subjective. The best solution to the problem is to narrow the exceptions on the basis of the credit mechanism for regulating incomes, and also to create and utilize reserve funds for wages at the level of the basic cost-accounting units.

New Searches at Enterprises

The basis for changing over from incentives for increase to incentives for the overall result was laid by experiments at the Sumy Machine-Building Scientific Production Association imeni M. V. Frunze and in the AvtoVAZ Production Association. The Sumy workers, for example, keep about 70 kopecks from each ruble of profit and deposit 30 kopecks into the budget. To put it more precisely payments into the budget have the form of a progressive tax. The greater the profit, the more solid the incomes of the enterprises and the higher the proportion of deposits into the resources of the society. In this experience one can see the most immediate deepening of the new conditions for management as a whole. The next task is to develop and test a mechanism for forming wage funds also on the basis of general results.

Externally, at first glance, the mechanism for the formation of incentive funds for the Sumy workers reminds one of shared distribution of profit, which is applied by many ministries. A more careful look reveals the differences. The main one is that the payments into the budget made by Sumy workers are arranged depending on the incomes and profitability, and payments according to the method of shared distribution of profit are based on expenditures which the society recognizes as socially normal for the enterprises. The greater these expenditures, the smaller the payments, and vice versa. Since expenditures annually fluctuate, the payments also change. Thus the interrelations between the society and the enterprise reproduce in renewed form the deposits of free residual, with all of their anti-cost accounting properties.

Incentives for the result raise in a new way the question of sources of financing of expanded reproduction. Since the result increases along with the production base and its improvement, it increases the pressure on the collectives to obtain investment resources. If these resources are granted by the budget, the best enterprises turn out to be the ones that have managed to take the most from the society. But when expanded reproduction is carried out at the expense of the collectives themselves, a different chain of events arises: current result--current wages--investments from internal funds--long-range result--long-range wages. Here the investments develop themselves and the subsequent results are of a nature that is truly involved with labor. It is no accident that the Sumy Association has been changed over to self-financing in technical reequipment, reconstruction and expansion of existing enterprises, and the automotive plant in Tolyatti--in technical reequipment and reconstruction. Here at AvtoVAZ they have formed a unified fund for the development of production. The Sumy machine builders are doing practically the same thing since they have been permitted to change among various sources of financing of noncentralized investments. If the current circulating capital and accumulated financial resources are not sufficient but the future effectiveness of new investments is sufficiently high, the collectives are permitted to use bank loans. As concerns the construction of new enterprises, in both cases this is financed by the society. This has the ring of the program point to the effect that the associations and enterprises will have greater opportunities and rights in disposing of the funds they have earned for the development of production, material incentives for the collective and solutions to social problems.

The increased development funds at these enterprises are coordinated with public interests through individual centralized normatives for their formation. The unified branch normatives have the greatest incentive force. If they are used then the centralized basis is to be provided through normative separation in the development funds of the part spent under the control of the society. The other part is "pocket money" which is utilized by the collectives independently.

Conditions for Effective Work

Placing responsibility on the enterprises for increasing production and effectiveness, not to mention the overall level of these, is impossible without expanding their rights. When their rights are narrow the only

responsibility is for fulfillment of plans established from above, that is, responsibility basically along the vertical--to the management agencies, and not along the horizontal--to the consumers.

The new conditions presuppose expansion of the rights of the enterprises. The number of centralized lists of positions has been decreased. In the Estonian Ministry of Light Industry, for example, of the previously existing 23 indicators, only six have remained as the basic ones. Internal investment funds have increased. Rights have been expanded for utilizing the savings on resources, additional payments and increments to wages have been introduced, and so forth.

But these rights have not been fully realized. The ministries demand of the enterprises that they improve both new and old indicators. This follows from the application of statistics that are not adjusted to experience. They establish, in particular, such indicators as commodity output, the development of the service of more than one machine tool, the spreading of brigade forms of labor organization, systems of quality control.... The surplus of positions on the list is apparent from the fact that, for example, KamAZ produces 18 kinds of products on the side and receives a plan for almost 150, including for producing instruments for the needs of the association. Even in the Sumy NPO they use 76 indicators, including many intermediate ones--of the manufacture of welded elements, the production of wood materials for containers, and so forth.

The "press" of the ministries is linked to their giving a number of enterprises additionally increased plans and assignments during the course of their fulfillment. Certain economic management agencies are in no hurry to reduce their power and, for example, they give the enterprises unjustifiably low normatives for increasing wage funds and incentives, leaving the rest for themselves for subsequent regulation, they recentralize the development fund, reducing the limits for the enterprises for construction and installation work, and so forth, and certain directors themselves are always glad to "consult" with their superiors in order to take less responsibility on themselves.

An important problem in further development of new methods of management is linked to overcoming the lack of correspondence among the multitude of existing systems of incentives whereby for one and the same effect sometimes less is paid and sometimes more. As a result, the interests of the collectives are directed toward what produces the better remuneration and not toward what is more advantageous to the society. Thus the fulfillment of agreements is encouraged by relatively stronger increases in production, profit and so forth. This leads to a situation where the enterprises, in order to guarantee successful fulfillment of commitments, reduce increases as much as possible even if they involve an insignificant amount of risk. The advantage from observing agreements exceeds the loss from increasing supplies from raw material and ready products which is necessary to ensure this indicator. As a result of these factors, the increase in the fulfillment of commitments sometimes entails a reduction of the possible volume of agreements and an increase in supplies.

There is also a lack of correspondence between the high percentage of deductions into the incentive funds from increments to prices (up to 70 percent of the increments) and the relatively low percentage of deductions from profit (approximately 12 percent). For reducing the production cost of products the enterprises of the Ministry of the Electrical Equipment Industry in 1984 deducted 6.6 million rubles into the material incentive fund, for fulfillment of the delivery plan--5.7 million, for the sale of products with the Emblem of Quality--19.4 million, and for reducing production costs as a result of introducing new technical equipment--10.4 million rubles. This leads to a situation where it is sometimes advantageous to violate agreements, to lose the special bonuses, the "progressive" rate, and some of the material incentive funds, but to overfulfill the plans for production of products that are sold with increments. The fulfillment of agreements is impeded by the calculation of wage funds depending on the volume of normative net output (which, in turn, does not depend on observance of the plan for deliveries) and the formation of profit without taking into account the fulfillment of contractual commitments.

The number of special bonus systems has decreased sharply. They have remained --for the creation and introduction of new technical equipment, technology and the delivery of products for export; for the development, assimilation and delivery of items of general technical equipment; and for the introduction of production capacities and construction objects.

In the AvtoVAZ Production Association all kinds of material incentives for 1984 were added together. The sum that was obtained was taken as a percentage of the profit. As a result they obtained a unified normative for incentives for economizing on every ruble. The VAZ workers even use increments to prices according to the general policy for the distribution of profit. This experiment is worthy of attention and dissemination.

The realization of the right to a 15-percent increment to the material incentive funds is made difficult by the requirement to observe the planned ratio between the increase in labor productivity and the average wages, which does not include the increment. The need to observe this ratio is weakened by other forms of incentives (economizing on past labor, the changeover of brigades to working with the fewer number of workers, obtaining above-plan profit and so forth) and brings about an underutilization of large sums from the wages that have been saved and excludes them from the incentive system. There is now a need to determine the ratio between the increase in productivity and wages, understanding productivity in the broad sense, including effective utilization of past labor and all the results of efficient management.

The majority of the collectives have accepted the increases voluntarily. And even if they are not very great, having them appear at the collective's initiative is better than having them achieved under pressure. But in order to realize the increase potential it is necessary not only to have a desire, but also to have material resources. And these are in short supply. Labor resources are also limited. A radical solution to the problem of personnel is mechanization and automation of production, which requires investments and time. Therefore the initial stage of the innovation has not made it possible

for a number of enterprises to fully satisfy the need for labor force. It is possible, of course, to increase the effectiveness of labor through increasing the output norms to the normal intensiveness of production. But this reserve has not been fully utilized. It has been necessary to deal with the degree of loading of workers in the majority of enterprises that are outside the experiment. In these places the "pressure" for the norms was not especially great. Therefore increasing these norms created a threat of a loss of labor force. When the new conditions encompass all enterprises in a given territorial unit, it would become feasible to increase these norms. At the same time it will become possible to approach a solution to the problem of reeducating do-nothings. Now they are transferred from the enterprise where they are criticized to enterprises where they are accepted. The unhealthy phenomena thus do not change in the end, they are not eliminated, and they simply change place.

Along with the effect that has been achieved the new mechanism also blatantly contains a residual effect. The increases in the normative net output, profit and other indicators would be higher if the experiment were not limited to the five-year plan. More favorable conditions for obtaining increases in economic results are produced by the activity of enterprises according to the plans in the 12th Five-Year Plan and the annual plans that are derived from them. Some of the funds for the development of production have not been utilized and they have only started to use some of them for technical reequipment. A new kind of economic thinking is gradually appearing and outdated ideas are dying out. The planned assignments and economic normatives have not always been stable. The residuals of the fund for the development of production have been taken away by financial agencies. According to the new requirements, the normatives for increasing wages and the incentive fund are conceived as unitary. But sometimes they have turned out to be differentiated: more for those who have worse indicators, and less for those who are operating successfully, that is, the former equalizing has remained. Thus in Ukrkhlebeprom of the UkrSSR Ministry of the Food Industry the normative for increasing the wage fund ranges from 0.1 to 0.25 (with an average normative of 0.18), and in the BSSR Ministry of Light Industry for the Inovolokno Association the normative has been set at 0.48 (for the rest of the associations it is 0.3). In the Ministry of the Machine Tool and Tool-Building Industry the normatives have been differentiated for the various industrial associations from 0.3 to 0.4.

Unfortunately, the normatives for increasing wages for the current five-year plan can turn out to be excessively differentiated since the ministries have been permitted to individualize them for the various enterprises within the limits of the overall wage fund for the branch. Nothing was said about this measure being an exception or a temporary one. Under these conditions the increased normatives can become a way of passively establishing the status quo and they can lose their stimulating role.

This tendency is reinforced by the fairly subjective way in which the leftover reserves of the ministry are distributed. The additional payment and increments to wages are distributed more "in breadth" than "in depth," and frequently they are more equalizing than differentiated. Cases of abolishing these are extremely rare. The money from the unified fund for the development of science and technology for work involving initiative is almost never

allotted. The collectives are afraid that their achievements might serve in the near future as a justification for cutting the amounts of the incentives.

The limited effect from the new conditions is brought about by the retention of elements of management that motivate the collectives to reduce the plans. Among these are the need to conceal reserves for fulfilling additional assignments, rendering patronage assistance, and obtaining above-plan profit (it is necessary in order to have the right to utilize the savings on the wage fund, to create financial reserves, to return credit used for investment, and so forth).

The upward development of the management system presupposes a refinement of the organizational structures of management and a strengthening of the incentives to improve the work of the ministries. A step in this direction is to award bonuses to managers of the higher economic agencies for the result of the work of the businesses under their jurisdiction and to permit them to spend the savings from the wage fund of the central staff of the ministries to reward the best workers (no limits have been introduced as with the rewarding of the engineering services). But this is not enough. It is necessary for elements of cost-accounting to appear in the ministries so that the workers are paid taking into account the effectiveness of the activity of the businesses under their jurisdiction. There is also a need to transform the work of the higher functional agencies to correspond to the new conditions--the Gosplan, Ministry of Finance, Gosstroy, Gossnab, Gosbank, Stroybank, State Committee for Labor and Social Problems, State Committee for Prices, Central Statistical Administration, State Arbitration Board and others.

The extension of the improved management mechanism to the work position has so far been limited to the fact that the brigades and individual workers are now more clearly oriented toward producing on time items that are necessary for the fulfillment of agreements. But incentives for increasing production, profit and so forth are in effect mainly at the level of the enterprises and the cost-accounting brigades. But in these the cost accounting is limited to accounting for an extremely narrow range of expenditures and there is a shortage of control and measurement instruments almost everywhere. As before, the brigades do not participate sufficiently in long-range planning and have practically none of the plans that are necessary for longer periods; the administration bears only disciplinary responsibility to the brigades while the brigades are responsible to it and its partners within the limits of the bonus remuneration. Bonuses for engineering and technical personnel are paid depending on the fulfillment of plans, which does not correspond to the principle of "increase" incentives which stimulates the adoption of more difficult assignments. Of the planning indicators priority is given to the fulfillment of assignments for labor productivity instead of the degree to which their composition corresponds to the model of the enterprise in the experiment. Synchronization of cost accounting from above to below is the main factor in bringing innovations to each worker.

The increased role of management in the development of business and the need for its rearrangement requires that this work be assigned to special organizational formations. Planning, financial and other functional services cannot take their place. And the line administrators are certainly not in a

position to do this. New organizational measures should apparently be prepared by special subdivisions which would expand the functions of services for scientific organization of labor.

A healthy economic mechanism is the best developer of progressive economic thinking. But if one adds to this active retraining of personnel, the return from such a mechanism can be achieved more rapidly. This is why it is of primary significance to train "captains and crews" of modern industry in the letter and, the main thing, the spirit of the new approach, the concept of management, and the ability to react intelligently both to standard and to unforeseen situations which are not described and cannot be described in any instructions. Higher and secondary educational agencies are also faced with responsible tasks. They are called upon to train specialists who are armed with the theory and practice of adopting and implementing decisions in a complicated and dynamically developing socialist economy.

Such are some of the immediate measures which are directed toward transforming individual improvements into an improvement of the entire economic mechanism and providing for a changeover from the experiment to an integrated system. They logically continue the innovations that have already been made and realize the desire for the new to reach its maximum effect. Therefore their very appearance is also the result of a tested mechanism of management which has addressed future problems.

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PIONEERING OIL COMPANY DIRECTOR INTERVIEWED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 5, May 86 pp 21-31

[Interview with Yu. N. Vershinin, general director of the Yuganskneftegaz Production Association, by Yu. P. Varonov, candidate of economic sciences: "Oriented Toward the Future"]

[Text] In the region of 55 degrees north latitude the Ob turns to the west. Here a tributary, the whip of the Dnepr, the so-called Yugan Ob, breaks off from it. After a couple of hundred kilometers the water of the tributary returns to the main bed, leaving behind it many islands, the largest of which is Pimskiy.

Before the petroleum workers arrived the islands were practically uninhabited--there was nothing but marshes. And if at that time somebody had said that a modern city would be constructed on the island nobody would have believed them. But here it is--the modern city of Nefteyugansk, which has been constructed almost entirely on earth that has been brought in.

This peculiarity is not the only one. One cannot but notice the fact that with the generally difficult situation in the petroleum industry here is an association that is regularly overfulfilling the plans for petroleum extraction --Yuganskneftegaz. The reader can learn about its operation from the materials in the selection offered here. This experience would be useful even against the background of successes. In the current situation its value increases many times over.

[Question] The association has achieved large successes under difficult conditions. How, in your opinion, can this be explained?

[Answer] The principal difficulty in the development of petroleum extraction enterprises today is that the building up around the deposits lags behind the rates of increase in petroleum extraction. This lag exists in our association as well, but to a lesser degree since we have devoted a fairly large amount of attention to it.

Enterprises of the association are introducing a system of comprehensive building up around the deposits, the release of wells "ready for operation,"

and other progressive forms of labor organization. Comprehensive building up makes it possible to increase fixed capital in the most effective way. This is the first reason why our indicators are better than those of other associations.

The second reason is the prompt development of technical parameters for petroleum extraction. A considerable share of the future deposits will have multiple beds. This requires a comprehensive approach and the utilization of several methods of extraction simultaneously. We are acquiring work experience in this area in an expedient way, knowing that it will be needed in the future. An example is the prompt assimilation of the gas lift method of petroleum extraction which we have been using for more than 7 years. The proportion of petroleum extracted in the association by this advanced method is close to 10 percent.

The third reason can be called the planned intensification of the operation of the wells. The flow method of production in Western Siberia is gradually receding into the past. As in other petroleum basins of the country, mechanical production is becoming the main method and pumps are now a part of the landscape of the middle Ob area just as they have made themselves at home in the Volga and other regions of the country. But it is possible to change the wells over to mechanical production in two ways: either to wait until the well has stopped flowing completely or to install the pumps immediately after the yield has dropped to some previously established level which can be called the threshold of effectiveness. For example, a well produces 20 tons of petroleum by gravity flow and if it is changed over to the mechanical method, it will produce twice as much. Or one can select another alternative--to retain the straight flow method for a certain amount of time and then only when its possibilities are exhausted to change over to mechanical or gas lift production. The more rapid departure from the flow method of production is the concrete path of intensification of the utilization of fixed capital. This makes it possible, in the first place, to make do with a smaller number of wells and, in the second place, it increases the reliability of the fulfillment of planned assignments.

[Question] Does the supply of assimilated wells increase the reliability of the planned assignments? For it is known that some of them are standing idle. Does this not create a reserve which guarantees against random occurrences?

[Answer] Behind these two questions lies a third: Is the association's success not explained by the fact that it has "subcutaneous fat," a hidden reserve for fulfillment of the plan? I shall answer immediately: No.

Now about the fund for assimilation. When production tasks are set consistently the oilfield workers do not have to have assimilated wells. The less productive wells should be changed over immediately to mechanical production. The fund for assimilation is formed because of the incomplete building up and because of the expectation of its completion and capital repair of the wells. In the Bashneft Association, which is a leading one in this respect the number of wells that are idle is equal to the number of repair brigades. All the drilling enterprises release the wells "ready for operation." With this approach there actually is no fund for assimilation.

We have one, but it comprises an insignificant proportion. Therefore we do have reserves for improving production indicators, but they are on the surface, in the form of the assimilation of new wells.

[Question] Let us return to the reasons for the association's production successes. They are obviously not only technical in nature?

[Answer] Undoubtedly, one of the most important ones is the stabilization of the collective. The coefficient of turnover has decreased from 27 percent in 1980 to 16 percent in 1983 and subsequent years. This created a favorable situation for work with personnel, increasing their skills and enabling them to accumulate experience. It is generally known that in a stable collective problems of material incentive and so forth are resolved more successfully.

[Question] Is it correct to assume that the reason for the success lies precisely in concern for the future?

[Answer] Not only that. It is no less important to be sure to carry out those measures which have already been included in the plan and to check on their fulfillment. For two five-year plans we overfulfilled planning assignments for the introduction of wells, the changeover of these to mechanical production, the reservoir pressure maintenance, and so forth.

[Question] Today how seriously does the building up of the wells and also the infrastructure lag behind the rates of petroleum production?

[Answer] You know that our association fulfills its plans for the production of petroleum and gas from one year to the next. As for the surface construction, it is obvious that in some places it is complete and some places it is not. As of 1984 the provision of schools amounted to 63 percent, kindergartens--58 percent, hospitals--38 percent and pharmacies--48 percent. This is the way it is with the development of social, cultural and domestic services.

As for the surface construction around the deposits, let me note this fact. The petroleum and gas administrations Mamontovneft and Yuzhnosurgutneft and Drilling Administration No 1 have practically reached the maximum level of extraction, but the plans for building up support facilities have been realized by 35-40 percent.

[Question] But you know, Yuriy Nikolayevich, when the plans are not being fulfilled the first thing is to talk about the fact that they are not well substantiated.

[Answer] That will not happen in this case. All the plans have been fulfilled in keeping with the norms and they, incidentally, are more economical than foreign analogues. If the dining rooms and domestic facilities included in the plans have not been built, no one can say that we are speaking about excesses. This is the same thing as if there were no reliable road leading to the deposit. Could you really say that everything is in order?

[Question] But still in 1984 Yuganskneftegaz increased the association's plan by 2 million tons and it was still fulfilled. It is as though the country received these 2 million extra tons of petroleum for nothing.

[Answer] You never get anything for nothing. The sad figures concerning social, cultural and domestic services and housing end up in increased turnover. This coefficient is now equal to 16 percent. Were it not for the arrears in housing construction and the construction of facilities for social, cultural and domestic services, this coefficient could have been reduced to 7 percent, that is, the conditions for work with personnel with respect to this point could have been brought into line with the conditions of the European part of the country. This not only would have meant stabilization of the collective, but would also have entailed a considerable increase in labor productivity and improved quality of the work.

Yes, we fulfilled an increased plan in 1984. But nobody is asking how we managed to produce this increase--and everything is here for them to see. The association sets conditions whereby an increase to the plan is possible. But I do not recall a case in which all of these conditions were fully met (but, of course, they never forget about the additional production). It turns out that the conditions for the operation of the equipment (increased pressures and speeds) and, consequently, there is greater wear and tear. By putting greater loads on the equipment now, we are proceeding in the direction of violating the stability of oil deliveries in the future. Thus the concerns of the current day in the orientation of the future come into contradiction.

The arrears in the surface construction would not be the central problem it is if we were speaking about curtailing production. At one time people would wait 2-3 years until the builders caught up and could pay their debts. But the situation is different now. The tasks of the association, like the tasks of the builders, are increasing from year to year. Under the new five-year plan we are to develop construction of four workers' settlements. If under the 11th Five-Year Plan we were to have put 40-45 kilometers of highways into operation each year, under the 12th this figure will be 120 kilometers. A three-fold leap. Will it be possible if we are held back by old debts?

[Question] Perhaps you have some constructive ideas regarding how to rectify the situation? For example, how does one interest in the builders in the final result--increased petroleum production.

[Answer] It seems to me that it is not a matter of interest. The difficulties lie elsewhere: in the absolute shortage of resources--material and labor. Yuganskneftegaz has the construction trust Yuganskneftegazstroy where wages depend on the final results of the work of the association. But as of today it too has a shortage of 500 people. Therefore we have always been prejudiced about proposal to increase the interest of the workers in the most radical way--to include them in the association. There is no point in taking on additional responsibilities when we should not have to answer for the mistakes of others.

The interrelations between the petroleum and gas field workers and the construction workers have their own peculiarities as well. When the plan is

established for petroleum production, the volume of capital investments necessary for its implementation is also determined along with it. But the latter consists only of what the Ministry of the Petroleum Industry requires of the construction workers. Between them and the association there begins a bustling trade, which is ironically called the "goose war." We prove that a given object must be included in the plan for construction, and the construction workers try to prove the opposite. As a result, after the first coordination only half of the initial planned assignment remains, even if one judges only from the volumes of capital investments. I recall that the plan for production of petroleum and gas cannot be adjusted and nobody would dare try to cut it in half. Previously the "goose war" usually began in September. Since 1984 it has been breaking out as early as April, when orders for equipment are coordinated with the construction workers. It is fair to change the deadlines because one must not order equipment if it will not be installed. But on the whole the relations that have arisen between oilfield workers and construction workers cannot be considered normal. They must be changed in some area. But where? Perhaps it is necessary to provide for coordination of the plans at the level of the ministry?

[Question] So far as we know the coordination is better in the internal relations among the enterprises.

[Answer] In 1978-1979 the association began to restructure the system for evaluating the activity of the enterprises. All the enterprises were gradually linked to the final result; the workers began to receive bonuses (up to 30 percent of the final wage) for fulfillment of planning indicators for volumes of production. There was a sharp change in the attitude of the people toward labor, and petty disagreements receded into the background. In the petroleum and gas production associations there are enterprises called BPO's (equipment rental bases). They engage in repair and rental of equipment. Frequently they have their own interests which do not always coincide with the interests of production. Because of the fact that the BPO workers now receive an increment to their wages depending on the production, the number of cases of lack of coordination and various kinds of disputes has decreased sharply.

Today the orientation toward the final results is developing downward and has reached the brigades. As we know, production brigades are not the only ones that work in petroleum and gas production. The spectrum of jobs is broad here and there are numerous preparatory jobs which until recently had their own criteria for evaluation and their own indicators--incentives for the volume and quality of work were provided according to these. Comprehensive brigades are now being introduced, and the workers of the preparatory and auxiliary brigades are given incentives according to the successes of the production workers. Measures are also being taken to link the transportation workers to the final result. Results have not been slow in coming. From my observations, linking them to the final result has produced a leap in the labor productivity of adjacent workers equal to 30 percent. The quality is greatly improving.

[Question] I would not be surprised if in the brigades even the wages for the cooks are linked to the final result in order to improve the quality of their work.

[Answer] No, wages in the sphere of services and at enterprises of the worker supply division are not linked to petroleum. But here too a link with the final result would produce its positive fruits. In any case, in the workers brigades it produces an undoubted effect. Judge for yourself. While previously it took 15-20 days to change a well over to mechanical production, now the same people do the same job in only 7-9 days. Why? Because they are interested in making sure that the well does not stand idle and that it does produce petroleum.

[Question] When there is interest in the final result few people have to be urged on and persuaded to do their work. But if the same problem is considered at the level of the association, to what level can one develop cost accounting of the enterprises and on which minimum functions can one concentrate the efforts of the staff of the association?

[Answer] An interesting question. But life is still more interesting. It would seem that cost accounting at the enterprises should reduce the volume of work not performed by the staff of the association. But in practice this volume is increasing! After the introduction of any cost accounting indicator the association is given the responsibility to monitor the fulfillment of the planned figure. One can judge how difficult this is if only from the fact that frequently they do not have the necessary technical equipment for measurement. It becomes necessary to invent methods of monitoring in midstream. Staff workers are burdened with the duty of consolidating the figures. I think that they should check on the fulfillment only of the basic production indicators: production volumes, labor productivity and expenditure of the wage fund. The enterprises should check on everything else. The association should engage mainly in questions of the future. This is not always what happens now.

[Question] But still: Which future issues are you as general director keeping track of now?

[Answer] I regularly check on the construction of schools, kindergartens, purification installations and housing. Once a month I must go around to all the facilities for social, cultural and domestic purposes that are construction. In general I try to figure out the work of the UKS in as much detail as possible and make sure that the contracting organizations are meeting all of their commitments.

Recently questions of oil field preparation have been under my personal supervision. This is related partially to certain arrears in the startup of capacities and also to the fact that previously not enough attention was devoted to the sphere of production activity. And to a considerable degree it determines the reliable work of the pipelines and the entire system of petroleum production.

[Question] Who helps you in solving long-range problems?

[Answer] A large share of the problems are resolved through the main administration but sometimes it is necessary to turn to the ministries. There is also a higher level--the joint decrees of three ministers that pertain to

construction.

[Question] And do you receive assistance from anybody on the outside, for example, scientific institutions?

[Answer] We collaborate actively with science. Branch institutes are involved in our affairs to the greatest degree: VNIIKRneft (which engages in problems of capital repair of wells), the All-Union Scientific Research Institute of Drilling Equipment, and the Siberian Scientific Research Institute of the Petroleum Industry (SibNIINP). Today it would be difficult to produce petroleum and gas without active assistance from scientific research institutes. Cooperation with VNIIKRneft is being arranged well. Workers from the institute are introducing new chemical reagents for drilling solutions at enterprises of the association as well as a number of original technical processes: open well bottoms, repair-insulation work with steel plasters, and repeated sealing of threaded joints. The last-named technological process has made it possible to reduce the time for capital repair of one well from 564 to 276 hours and to cut the cost almost in half. The least successful are relations with SibNIINP, which develops group technical plans for each deposit and provides authors supervision of the quality of the construction of the wells. Basically the institute introduces guideline documents and as soon as the matter gets down to the original technical solutions things start going wrong. For example, it was a good idea to utilize in drilling the invert emotion solution (IER), but in introduction it turned out that it is difficult to prepare, it is expensive, the reagents freeze during the winter, and so forth.

In my opinion, the reasons have not so much to do with the incomplete work of the institute's associates themselves as with the inadequate amount of attention paid to it by the main administration. SibNIINP is perhaps the only institute in Tyumen which does not have its own building and it simply cannot be compared with such a giant as Giprotyumenneftegaz.

Of the large institutes we have close ties with the Moscow Institute of the Petroleum, Chemical and Gas Industry imeni Gubkin, which in conjunction with the All-Union Scientific Research Institute of Drilling Equipment has also developed an invert emotion solution. This IER was the winner in a competition with the solution developed by SibNIINP.

In our contacts with scientific research institutes we sometimes have pleasant surprises. We were trying for a fairly long time to find local building material that was suitable for our purposes. This turned out to be arboblock, that is, concrete blocks in which wood chips are used instead of gravel. And now we are learning that this problem has been dealt with thoroughly by the Saratov Scientific Research Institute of Rural Construction. We reached an agreement with this institute and in 1975 began to sell plans for two-story buildings, kindergartens and subsidiary facilities made of arboblock.

[Question] Do academic institutes also cooperate with the association? For example, institutes of the Siberian branch?

[Answer] No, but we would be glad to arrange contacts with them. We have many large-scale research problems.

[Question] Here we are talking about the future, but how great is it? It may not be very soon but even now one can assume that there will be a time when the petroleum producers will have less work. Yet permanent housing has been constructed for hundreds of thousands of people: settlements, cities....

[Answer] This problem exists in somewhat different form even now: we need comprehensive support for the work positions. It is mainly men who are employed in oil production and in Nefteyugansk there is a shortage of jobs for women. From year to year at the oblast level we ask for a sewing factory to be located in Nefteyugansk, but our suggestion meets with no understanding.

We have taken certain steps in the direction of a multibranch economy when satisfying our own production needs. I have already spoken about arboblocks. Next in line is the production of keramzit and brick. Now the majority of construction materials are shipped in from far away. There is a certain possibility, not a great one yet, of reducing this proportion. A base is being developed for repair of drilling equipment. In the future it will be possible to create a plan for the repair of wheel and caterpillar tractor equipment. Beyond the time periods which I have named Nefteyugansk could become a powerful base that provides for the advancement of petroleum and gas field workers to the north.

And, of course, an immense wealth surrounds us--the forests. It is possible to have significant development of the timber industry on the basis of selective fellings and simple clearing of the forest. For regardless of how much oil may be produced here, the surrounding nature is more virgin than it is in the European part of the country. Now, as part of the fulfillment of the plan for consumer goods, we are assimilating the production of simple commodities made of wood so that we do not have to ship them in over long distances. But this is only the beginning, and nonetheless it still raises new organizational problems: interrelations with the timber industry, the combination of felling sections for roads and obtaining raw material for new production, and so forth.

[Question] So Nefteyugansk and the association of which you are in charge has prospects for development that go into the distant future?

[Answer] There is plenty of work for everyone; I can guarantee that.

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METHODS OF ASSIMILATING PETROLEUM DEPOSITS DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIIA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 5, May 86 pp 32-35

[Article by V. M. SEDELEV, deputy general director for personnel at the Yuganskneftegaz Association: "'Flying' and Permanent"]

[Text] A good deal is written about the watch-expedition method and there are a multitude of viewpoints about watch workers. Frequently people extol them, guided by the general considerations of the economy of this method of assimilating the petroleum deposits of the Tyumen North.

There are two forms of watches: organized and individual. In the former case the organization which is located in a region with a surplus of labor takes on certain volumes of work which are done with the help of its technical equipment and its workers. The latter continue to obtain their wages from this organization but with the additional payments for working in the North. In the Yuganskneftegaz Association there are two organizations that send out watch workers--the Slavyansk Administration of Technological Transportation from the City of Slavyansk in Krasnodar Kray and the Menzelinsk Administration for Prospecting Drilling from Tatariya. Both organizations are working well and are regularly fulfilling their planned assignments. But since the association has managed to increase its drilling capacities the need to enlist drilling workers from Tatariya has dropped. As for the Krasnodar Transportation Workers, their specialized column involving 700 people will continue to work at the Yugansk Deposit.

Even here one can see our differentiated approach to the problem of the watch method. In each individual case it is necessary to figure out who is flying in from thousands of kilometers away to work for us. The more so when we are dealing with an individual watch.

When one looks through the lists of watch workers or, as we call them, the "flyers," one notices that the range of occupations is extremely broad. Among the "flyers" with specialties that are truly in short supply one can find, for example, a welder of the second category or even a cleaning lady. Why spend money on air travel bringing in people whom we could find right here in the local area? This pertains especially to women for whom we do not even have enough jobs. But at the enterprise these general problems are not clear and

that is where they solve the problems of who will occupy which job. And if it can be filled with watch workers, this is what the enterprise will do. Only at the level of the association is it possible to see the connection between "flyers" and permanent workers.

How does one escape from the situation that has arisen? It would be possible to draw up a list of occupations which cannot be held by watch workers. But we have taken another path: we have singled out the enterprises which fly in less than 20 watch workers and suggested that the managers think up measures for changing over completely to permanent personnel. Here we have been guided by the consideration that in places where not many watch workers fly in it is more difficult to organize their labor. Because of this measure in 1985 we managed to reduce the number of "flyers" somewhat.

Why are we generally oriented toward reducing the proportion of watch workers? I shall give a couple of figures. While comprising less than 9 percent of the collective, watch workers are responsible for one-third of all the violations of labor discipline. In places where the proportion of watch workers is high the average labor turnover is also high. As compared to permanent personnel their labor productivity is lower and it is of poorer quality. Of course these are the average indicators. There are enterprises where the proportion of shop workers is high and the results of their labor are excellent. One can also find enterprises where disorder reigns even when all the personnel are permanent. If a general pattern can be traced fairly clearly and this has determined the association's orientation toward permanent personnel. The main administration and the ministry are both following the same line. Perhaps the association is even less consistent in this question than the higher organizations are. The watch expedition method makes it possible to ease the situation with housing, kindergartens and schools, and from this standpoint it has a positive effect on the collective. But watch workers themselves comprise a labor force of poorer quality than that of workers who live in Nefteyugansk.

When one becomes familiar with the calculations of the effectiveness of the watch method one can see the central position occupied in it by the comparison of the cost of housing and the social infrastructure in the South and in the North. Such a comparison would be justified if there were a selection: to build there or here. But in fact the selection is different--to build or not to build. For a school which is "saved" in Nefteyugansk will not appear in the Ukraine or Patariya.

The general considerations of the effectiveness of the watch expedition method do not sufficiently take into account the actual contingent of watch workers.

For a fuller picture of the situation with flights of watch workers I shall give the figures for one of the administrations for drilling work. (I should note immediately that the number of personnel on the watch in this administration for drilling work has already been reduced to two-fifths of the previous number and therefore it no longer has the most inexpedient watches.) The workers fly in from four cities: Orenburg--188, Ufa--127, Bugulma--120, and Kharkov--48. But not all of them live in the cities from which they fly. Two of them come to the Orenburg Airport from Sterlitamak and six come from

Bugulma. Two people come to the Kharkov Airport from Voroshilovgrad, two from Donetsk, one from Cherkassy and so forth.

They fly out of Orenburg every Wednesday on a TU-134 aircraft. The length of the flight there and back is 4 hours, 50 minutes. The watch consists of 76 people and the cost of the trip in both directions is 5,316 rubles. The watch flies out of Kharkov four times a month in a AN-26 (cargo) aircraft. The length of the flight is 13.6 hours here and back with a landing for fuel in Ufa or Perm. The cost of the trip is 6,800 rubles. The watch consists of 19 people.

In the airports of departure (Ufa, Orenburg, Kharkov and Bugulma) the trips are staffed by the dispatchers. The question of completing the watch is decided in Nefteyugansk by the Central Engineering and Technical Service of the Drilling Administrations. There are rarely cases where the members of the watch fail to arrive because of unsatisfactory reasons. The delivery of the workers from the airport to the place of work is organized by a specially assigned individual--the supervisor of work or the shift chief. In the Mamontov Drilling Administration the watch workers are taken to their place of work by a bus over a distance of from 10 to 50 kilometers. These same watch workers whose work position is at the base (electric installers, electric welders, fitter-repairmen, workers for control and measurement instruments and automation, carpenters) are given space in the dormitory. The distance between the airport in Nefteyugansk and the village of Poykovskiy, for the watch workers of the Salinskiy Drilling Administration work, is 60 kilometers. In the winter the traveling time is 1 hour. During the autumn and spring period when there are no permanent crossings across the Yugan Ob it is very difficult to take the watch workers to the village and the time en route increases to 4-5 hours. The time it takes the watch to get from the village to the drilling fields ranges from 30 minutes to 1 hour. The watch workers who are working in UBR-2 spend from 1 to 3 hours on the road from the airport to the watch village (a distance of from 50 to 150 kilometers).

Before watch workers are sent to the drilling fields their health is checked by a medic. And in spite of the fairly high level of organization of transportation of the watches to their place of work, the length of their trip causes great fatigue in the watch workers, which predetermines the low productivity during their first days of work. If the trip is prolonged because of weather and climatic conditions this makes the watch shift considerably more difficult and increases the overall fatigue of the workers.

In the airports of departure there are no special premises in which the watches can rest. They do not have them in the Nefteyugansk Airport either. And they are necessary, especially when the trips are delayed. Unfortunately, nobody is dealing with this problem--they say that this is because of the tendency toward a reduction in the utilization of the watch expedition method.

Thus even in regions with a surplus of labor the association does not receive the watch workers in a single contingent but must gather the workers almost one by one.

The work experience of other associations also shows that it is difficult to acquire a high-quality labor force by the individually organized watch method. It seems that the labor collectives should bring together in the European part of the country and transport to the North people who belong to an already existing organization. Then the watch method would be a variety of the subcontract. One can become convinced of the effectiveness of this approach by the experience of the BAM and our cooperation with two associations--from Krasnodar Kray and Bashkyria.

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IMPROPER USE OF PERSONNEL DECRIED

Novosibirsk EKONOMIKA I ORGANIZATSIIA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 5, May 86 pp 35-39

[Article by Yu. G. Byk, secretary of the party committee of the Yugansk Neftegaz Association: "Specialists in Workers' Positions?"]

[Text] Among the many difficulties that arise in work with personnel I should like to single out one--when a specialist with a higher education is employed in physical labor. On the whole such a situation can be regarded as negative: was it worthwhile to spend state money on lengthy training in order for a person to end up in a labor job? But for the enterprise the expenditures made by the state for unnecessary training are external and therefore sometimes both the management and the personnel services close their eyes to cases when a specialist is working in a laborer's position.

In the Yugansk Neftegansk Association for several years now the work with such specialists is considered to be among the most important. And it is not just that we are obliged to look out for state interests and that any work with personnel always has a political constituent. For an association working in a region of new industrial assimilation, specialists in labor positions are an essential source for augmenting management personnel. As distinct from those who are brought in from the outside, these people know the specific nature of the local conditions, the technical equipment that is used, the living conditions and the level of labor organization.

The initial stage of any work is an analysis of the existing situation. First we investigated the reasons for changing specialists over to labor positions in 1981. At that time about 2,000 specialists in the association were working in labor positions; their proportion was higher than the average in industry.

Generally speaking, the very existence on a unionwide scale of a "specialist in a labor position" bears witness to a multitude of processes, including the gradual approximation of physical labor to mental labor. This is an objective process that is conditioned by scientific and technical progress. But at the same time, when entering a VUZ or tekhnikum a young person is preparing himself for engineering activity. And the state is counting on this. What causes a graduate to go to work as a laborer?

The numerous factors can be combined into three groups. The first includes the need for special knowledge in certain labor positions, particularly when running complicated equipment. The second includes dissatisfaction with the labor of engineering and technical personnel, including lower earnings than those received in labor positions. Finally, the third includes various subjective factors. A specialist who is the second member of a family cannot find work in his specialty in a place where the head of the family is working. Another specialist, because of the peculiarities of his nature or shortage of moral qualities, finds it difficult to work with people.

In analysis it is necessary first of all to isolate the factors in the second group from all the others. Even in this stage individual conversations are inevitable, both with the specialists themselves and with their managers.

But here we have explained which specialists have transferred to a labor position because of dissatisfaction with the labor of engineering and technical personnel. From the materials of a questionnaire, only 39 percent of the specialists gave the low earnings as a reason. In results of individual conversations one can note that this proportion was lowered in the responses on the questionnaire, but nonetheless it shows that the desire to increase earnings is not the only reason for changing over to a labor position. Moreover, from the answers to the questionnaire questions this reason occupied only third place, leaving the first two places to other factors: "The abundance of nonengineering labor"--44 percent and "too much office work"--46 percent. This is how the reasons for departure from engineering positions are evaluated by those who have already transferred to a labor position.

But of those specialists employed in engineering positions the large volume of nonengineering work was noted by three-fourths of those questioned. At the same time, those employed in engineering positions generally do not mention earnings as a reason for a potential transfer.

The questionnaire made it possible to form a comprehensive reason why a specialist would transfer to a labor position. It is not wages as such and it is not the content of the labor in and of itself. Somewhere in the depths of their souls these people apparently recognize that if it is necessary to perform much nonengineering work it would be incorrect to count on higher earnings. A reverse pattern can be noted: the lower the wages, the lower the prestige. Therefore increasing the wages for engineers on a unionwide scale would undoubtedly lead to an increase in their prestige. Within the framework of the association this problem could be solved by changing the form of payment for engineering labor. In our opinion, it is necessary to link the wages of the engineer to the final results and to make additions into the existing systems of bonuses. The association does not include engineers in brigades and therefore it has linked the additional payments for the labor of an engineer to the results of the activity of the enterprise and the association. This is generally the traditional path.

What principally new aspect have we introduced into personnel work with specialists who are in labor positions? The first initial principle of our work is this: regardless of the reasons for transferring to a labor position,

the engineer cannot be really satisfied with his labor in this position. When questioning people who had already transferred to a labor position we found out that the percentage of those who are dissatisfied (26.5 percent) was higher than the analogous indicator for people working in their specialty. This fact shows that it is not only on the basis of the interests of production, but also to meet the authentic interests of the workers that we must provide them with work in their specialty. One-fourths of the specialist workers would like to transfer to work in positions of engineering and technical personnel.

The second element of the initial position is that in addition to the differences in wages there are two other elements that are attractive about the labor position: there is more free time and less responsibility. We are trying to bring order into the organization of engineering labor and free up part of the working time of engineering and technical personnel for recreation. As concerns the reduction of responsibility, the attractiveness of this factor, in our opinion, is related to poor VUZ education. During student years the person has not acquired an idea of what is expected of him upon completion of the VUZ. If he were consistently prepared for managing people and the need to be responsible for them and the results of production, then a considerably greater proportion of engineering and technical personnel would prefer work in their specialty and would not take shelter in the peaceful and highly paid work in the position of a laborer.

And one more circumstance: there are no legislative prescriptions that make it obligatory for a person to work in the position of engineering and technical personnel if he has worked out the stipulated period after graduating from the VUZ. Therefore administrative devices are unacceptable here and the only path involves methods of persuasion and individual conversations.

First we drew up a list of all specialists employed in labor positions. Workers from personnel services of the enterprises held conversations with them. For every specialist included on this list new variants of labor placement were worked out. Then the individual was invited to the division of management personnel of the association and prospects of his further labor biography were discussed with him. The possibilities of offering a management position are considerably greater in an association than in an enterprise. In each concrete case it was necessary to solve a chain of interconnected problems: housing, wages, labor placement for the wife or husband, etc. The majority of workers were understanding about our efforts and aware of their civic duty. For communists, of course, there are other measures of influence—along the line of the local party organizations, the party bureaus of the enterprises and the party committee of the association. Incidentally, the proportion of party members in this category of workers was fairly small.

Sometimes after a conversation the specialist would even agree to move to another settlement, which reflects the particular local conditions and the ease with which large numbers of workers will move. We devoted special attention to specialists in occupations of the nonproduction sphere, mainly teachers. In this area we were helped considerably by the reform of the secondary school and the higher wages for its workers. The explanation of party decisions was organically interwoven with the work that is described.

Materials from sociological research concerning advancement of specialists in their jobs were helpful in the conversations. This is the way things stand now: During the 3 years since they were placed in their jobs, out of every 100 young specialists 37 are discharged and 42 are transferred to a higher position. Only 21 out of 100 people remain in their previous place of work. Who are these who remain? Mainly (90 percent) women, and their remaining in one place to work is explained by family circumstances. A statutory leave or the need to care for a child. It turns out that each one of the men who have remained in their job have an almost 100-percent chance of obtaining a promotion. This probability is especially high for drilling workers and somewhat lower for transportation workers. This fact exerts a certain positive influence in the conversations.

Today engineering and technical personnel in labor positions are an exception for us. The personnel divisions of the enterprises, knowing the fundamental position of the association regarding this issue, try to hire a specialist to work in the specialty he has acquired.

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ECONOMIC, ORGANIZATION, MORAL PROBLEMS OF SCIENCE DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIIA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 5, May 86 pp 40-63

[Interview with V. A. Sidorov, deputy director of the Institute of Nuclear Physics of the Siberian Branch of the USSR Academy of Sciences, corresponding member of the USSR Academy of Sciences, by Yu. Nikolskiy: "The Ruble Within the Atom"]

[Text] Fundamental science expands knowledge about the surrounding world. In our time this is no longer an occupation for single scientists, but an activity which requires immense expenditures, complicated equipment, and an organizational structure that is not simple. For successful functioning of fundamental science it is necessary to solve problems of both an organizational and an economic nature.

When solving these problems fundamental science frequently creates as a byproduct quite new, unusually effective technologies. The difficulty of introducing these results and the economic, organizational and moral problems of fundamental science are the subject of our discussion.

[Question] Veniamin Aleksandrovich, sometimes one has occasion to hear statements to the effect that tens of millions of rubles are being invested unintelligently, say, in research on elementary particles, and that it would be better to use this money for solving applied problems--then the effect would be not in the distant future, but in the near future. What is your attitude toward these judgments?

[Answer] This opinion is incorrect. Usually when explaining the need to develop fundamental sciences people say that they are laying the basis for future technologies, determining the directions of technical progress and so forth--all this I shall try to show in our conversation. But this is not all there is to the role of fundamental sciences. We know of many examples in which large amounts of money were used for important applied directions in the development of science and technology and the effect turned out to be insignificant. Why? Primarily because we had not created a scientific

collective capable of spending the money that was allotted with a maximum effect. It is impossible to enlist enthusiasts with money alone. The creation of a truly creative collective is an immensely difficult task.

What is the basis for the involvement and frequently the self-sacrifice of youth who decide to devote their lives to the physics of elementary particles? First of all, on the desire to understand how the world is constructed. There is no more attractive task for a curious mind.

[Question] But apparently nuclear physics has something special to attract youth?

[Answer] Perhaps the rate of its development? This area of sciences developing so rapidly that the names cannot keep up with the content of the scientific activity. But from common sense we should admit that atomic physics in fact is chemistry, since it is precisely in chemistry that one studies the various conditions of the atom and the bonds between atoms. What is called atomic physics is actually physics of the atomic nucleus. In exactly the same way the names of the practical applications lag behind. Atomic energy is chemical energy. And at atomic electric power stations one uses energy from fission of the atomic nucleus, that is, nuclear energy.

After such a philological digression one can say that the Institute of Nuclear Physics does not engage in the study of how the nucleus of the atom is constructed. The main sphere of our scientific interests is in figuring out how elementary particles are constructed. This is the leading edge of physics, it is precisely here that one can receive the answer to the question of the interconnections among such fundamental concepts as matter, space and time.

The second area of our institute's work is research on the problem of controlled thermonuclear synthesis. The concrete, completely utilitarian goal of this research--to offer mankind an inorganic source of inexpensive energy--formally it makes it possible to include it in the category of applied science. But the scope of the work for studying the new physics phenomena related to this problem and the technical and organizational methods of work that have been adopted in this area of research set the task of obtaining controlled thermonuclear synthesis in a number of more complex fundamental problems of science.

[Question] Do you wish to say that people are joined together into the collective not for the sake of satisfying material interests, but around a scientific idea?

[Answer] An idea alone is not enough to create an effectively working research collective. A scientific institute with a healthy psychological climate can be formed only around an exceptional, outstanding individual. In applied research a collective is frequently created around a task. The organizational function is performed by the plan as such. As concerns fundamental, investigatory research, in it the decisive role is played by the personality of the scientific leader. He is the one who sets the research task and the idea of the ways of achieving the goal are formed in his mind.

In our institute in particular this tradition has been established. If the head of the laboratory leaves, the laboratory is disbanded. Throughout the entire history of the institute there has not been a single exception to this rule. A laboratory chief who has left has never had a successor, and a new chief has never been appointed to a laboratory that has ended up without a leader.

[Question] But where do the associates go in this case?

[Answer] The management of the institute considers their cases individually and tries to find jobs that correspond to the experience and qualifications of each.

When a laboratory chief continues to work it is possible to separate from him, to "branch out" a new laboratory and a new scientific direction. The management of the institute uses very high and rigid criteria for this. But it is impossible to "overthrow" one's immediate supervisor. Everyone knows this and it has a favorable effect on the moral and psychological climate of the collectives. I think that this practice could be applied more extensively. Incidentally, one exception was nonetheless made--for the institute as a whole. After the death of Andrey Mikhaylovich Budker the Institute of Nuclear Physics continues the work he started under the leadership of his favorite student, Academician A. N. Skrinskey. But A. M. Budker was an exception himself. He did not simply create a scientific school. Approximately 10 directors of institutes and leaders of large projects have been educated in our collective. As Andrey Mikhaylovich liked to say, the exception only proves the rule.

[Question] But still let us return to the scientific idea; after all, it was there when the institute was founded, was it not?

[Answer] The institute was formed around two ideas: one of them pertains to physics, the other to economics. The first consists in the following: the basic instrument of the experimenters in our area of science is the flow of charged particles obtained in special installations--accelerators. By directing the flow toward a target the physicists detect the structure of the substance of the target, the nuclei of the atoms of the substance, the nucleons of which these nuclei consist...the higher the energy of the particles that are utilized the "deeper" one can penetrate into the mystery of the construction of matter. Advancing along this path, physicists are creating larger and larger accelerators. In the 1960's the sizes of these "instruments" passed the kilometer mark, and the cost began to be measured in tens of millions of rubles or dollars. But the most difficult thing is that, beginning with a certain energy, when the speed of movement of the particles becomes fairly close to the speed of light, each time the effective energy of the collision of the flying particle with the particle of the target is doubled it requires a 4-fold increase in the sizes and cost of the accelerator. This happens because the mass of the rapidly moving particle increases many times over and upon the collision of such a heavy particle with an immobile (and, consequently, light) particle of the target it is impossible to realize all of the energy that is so valuable to us.

The only path to increasing the effectiveness of energy utilization is for a heavy particle to collide with a heavy one, that is, to disperse the particles of the target and direct two bundles of particles against one another. Success along this new path was achieved simultaneously by two groups of physicists in opposite corners of the earth—in California and in Siberia.

It is precisely this achievement that is the scientific trademark of the Institute of Nuclear Physics of the Siberian Branch of the USSR Academy of Sciences. Accelerators with bundles that collide are now in operation and are being constructed throughout the world. The method has not simply received general recognition; it has become the basic one in experimental research on elementary particles.

The second idea, the economic one, led to a situation where the physicists began to develop and produce industrial equipment for enterprises of the national economy which is related to the experimental equipment they create.

[Question] But this requires a plant within the institute.

[Answer] We need a plant anyway. It is impossible to conduct research on high energy physics without a continuous process of creating large accelerator installations, their modernization and their reconstruction. If this matter were left in traditional channels—submit the order to an outside design bureau, find a plant which will manufacture the equipment and an installation organization, then supervise, select and assist—all this would take a decade or perhaps even more. The creation of installations under these conditions would not assure us of leading positions in world science.

The only way out was for the institute to create its own engineering-technical and production base. Siberian physicists understood this long ago and our institute began with the creation of production shops; only then was the main laboratory facility constructed.

[Question] In and of itself the idea of creating a powerful experimental production is not a new one. What are the specific features of the approach of the Siberian nuclear physicists?

[Answer] In the first place, this is not an idea but a reality, but in addition to this Andrey Mikhaylovich Budker laid the basis for the economic experiment in science. The experiment pursued two goals. The first was to prove that high-energy physics is not only an item of expenditures, that it is not only directed toward solving future scientific problems, but that it can also produce an advantage for the national economy in the present. Because of this advantage it is possible to free the state from spending some of the funds that go for maintaining a large research collective.

The second goal is to develop an important direction of scientific and technical progress by solving important problems related to introduction. Advancing along the path of their own research, physicists still must engage in engineering and experimental design activity. And with a small amount of completion work the results of their activity can be used in industrial

production. And if they can, then they must introduce the technical decisions that have been developed into the national economy.

In 1966 Academician A. M. Budker went to the Academy of Sciences and requested permission to conduct an economic experiment in which, on the one hand, they would provide for an additional financing of resource and, on the other, the introduction into the national economy of those achievements that were made along with the experimental research in high-energy physics. And permission was given for this experiment.

[Question] Is partial self-financing possible because of the output of industrial accelerators?

[Answer] We are now selling various kinds of electrophysics equipment for 10 million rubles a year. Most of it is industrial accelerators, but there are also orders for other kinds of installations which we are able to manufacture. Almost always the basis remains the same. Our items are used for industrial radiation technology or for research and experiments in the same area.

[Question] Could you briefly describe the scientific and technical aspect of this technology?

[Answer] Radiation technology for industry is nothing new. Isotopes have been used for several decades, and the sphere of their application has become relatively stable. But the possibilities of isotopes have been largely exhausted and they should be replaced by industrial accelerators. In the first place, isotopes are a constant source of radioactivity and therefore it is fairly difficult to organize various kinds of auxiliary operations-- transportation, replacement, repair and so forth. The industrial accelerator is incomparable simpler to deal with in this respect. All one need do is turn it off like any other machine or instrument and the radiation disappears. In the second place, the range of application of isotope technology is limited to the small capacities of radiation which can actually be produced by radioactive isotopes. Of course there are also limitations on the capacity of radiation generated by industrial accelerators, but the existing needs can be entirely accommodated within these limitations?

The largest batch of industrial accelerators that we produced was acquired by the Ministry of the Electrical Equipment Industry. In my opinion, it is one of the most progressive ministries in the country where they are attentive to technical innovations and are not afraid of the difficulties of introduction. In conjunction with the All-Union Scientific Research Institute of the Cable Industry we have developed radiation technology for increasing the heat resistance of cable installation. This is now the most advanced area of introduction of industrial accelerators into production.

The leadership of the Ministry of the Electrical Equipment Industry has notified us that under the 11th Five-Year Plan the economic effect from the introduction of radiation technology in their branch on the basis of accelerators developed and manufactured in our institute amounted to 250 million rubles.

Various plastics are used to insulate cable items. If you want a more durable and heat-resistant installation you use expensive plastic. If you want cable that is less expensive you use polyethylene, but then the heat resistance will be somewhat less and it will wear out more rapidly. Why? The polyethylene layer consists of long fibers--threads that are not connected to one another. At a temperature close to 100 degrees this installation begins to melt, the threads shrink together and the insulation gets out of position. But if it is subjected to sufficiently powerful radiation the fiber-threads seem to become untangled and compounds and chemical bonds are formed. The insulation will be not a totality of individual fibers, but a solid fabric whose threads have cross "stitches." The polyethylene shield on a cable or wire now withstands temperatures up to 200 degrees and has considerably greater mechanical durability. The idea of such technology existed before us, but we made it feasible because of the fact that we produced inexpensive radiation.

The pioneer of the introduction of industrial accelerators into the cable industry was the Mozyrkabel Plant. Two technological lines of this plant produced an economic effect of 3 million rubles as early as 1976. Other cable plants followed after them: Azov Kobel, the plant in Podolsk, and others. About 2 dozen accelerators have now been installed in cable plants of the Ministry of the Electrical Equipment Industry. The electrical equipment plant in Beltsy uses inexpensive radiation to strengthen polyethylene pipes that are used in electrical installation. But the main thing is that these pipes after radiation acquire the quality of heat shrinkage. It is as though the pipe "remembers" its form at the moment of radiation. If a radiated pipe is inflated to a larger diameter, after heating it returns to its previous, small diameter.

[Question] The sphere of application of the effect of thermal shrinkage is probably not limited to the cable industry, is it?

[Answer] It is exceptionally broad. Here is one of the problems which has been solved successfully with its help. We know that now the basic insulation of pipes in main pipelines is done under plant conditions. When the pipes arrive at the line the only places where they have no insulation is around the joints and in the places where they will be welded. Under field conditions it is necessary to insulate only the seams themselves and the parts of the pipes adjacent to them. It would seem that thus a considerable proportion of the work would be transferred from the "field" to the plant, which essentially reduces the labor-intensiveness. But the labor-intensiveness of manual work for insulating the seams has turned out to be no less than the mechanized process of insulating already welded pipes.

Heat shrinkage makes it possible to simplify the technology of insulating joints considerably. The radiated sleeve whose diameter is increased by stretching after radiation is slipped onto the pipe before welding and moved away from the joint. After the seam has been made and tested the sleeve is moved toward the joint and allowed to cool. Shrinking in size and resuming the form it had at the moment of radiation, the sleeve fits tightly over the seam and provides reliable sealing.

It would seem that the task is clear and there would be no doubt about the economic effectiveness from the introduction of this technology, but the department that develops the technology and the two departments that are the potential consumers cannot agree with the Ministry of the Chemical Industry about the output of sleeves with heat shrinkage.

In general these sleeves are only a particular instance and heat shrinkage works well everywhere where it is necessary to compress, pack, condense and seal. Film with these properties is used, for example, when packaging poultry before it is sent to the stores.

[Question] One can conclude that radiation processing of plastics is one of the promising directions of technical progress. Are there any other similar examples?

[Answer] Two accelerators produced by us are now in operation at the Odessa Elevator. They are used for disinfecting the grain. As distinct from chemical methods of treatment, radiation does not kill the insects, it only sterilizes them and makes it impossible for them to reproduce. This is enough for the decontamination of grain. Chemical methods, on the contrary, destroy the insects, but not all of them--only those that are in the biologically active phase. A certain amount of time after chemical treatment, new insects appear from the cocoons, larvae or eggs--I am not sure which. But radiation destroys the ability to reproduce in all forms.

Additionally, chemical treatment involves the use of toxic substances. I cannot say if any of these substances remain in the grain, but I can fully guarantee you that no radiation remains in the grain. Industrial accelerators produced by us will be installed in other elevators of the country as well. Radiation disinfection of grain is becoming a regular, generally accepted technology.

Of course neither disinfection of grain nor processing cable insulation can give an idea about the broad possibilities of the utilization of inexpensive radiation in industry. The technology of the polymerization of paint and varnishes, for example, is fairly complicated. In order to obtain a shiny surface on the housing of a radio or television set it is necessary to have complicated, lengthy and not always safe thermal processing of this surface. And a lengthy operation requires significant production space. After changing over to radiation technology it is sufficient to go over a wooden panel with a radiation device and the process is completed. Both time and space are saved. Similar processes produce an effect in polymerization of films and artificial leather.

There is also the cutting and welding of metal with a bundle of electrons. One of our accelerators was purchased by the Japanese firm Kawasaki Heavy Industries, which produces, in particular, large tankers and complicated technological equipment. The accelerator was used in a laboratory which engages in the development of new methods of welding. We would much rather have installed one of these in one of the Soviet shipbuilding plants.

There is a multitude of technological processes directed toward breaking up chemical compounds. These are mainly processes for purification of industrial wastes. Thus wastes from the production of synthetic rubber have a rare resistance. They must be stored for a long time and it is necessary to spend money not only on their storage, but also on ensuring the safety of the surrounding environment. After these substances are subjected to radiation treatment they break down into harmless components.

[Question] The decomposition of rubber wastes is again a particular application.

[Answer] Perhaps the most extensive possible application of radiation is for neutralization of municipal wastewaters and wastewaters from animal husbandry farms, above all large hog complexes.

[Question] Do you really think that sometime in the future next to each hog farm there will be a source of radiation which can be used to neutralize the wastewaters?

[Answer] I do not see anything unusual in that. It is worse when one cannot take a dip in the river because of fear of pollution with wastewaters.

[Question] And this is not dangerous?

[Answer] I guarantee that it is not.

[Question] Your institute has been working on the introduction of radiation technology for many years now...

[Answer] Yes, since 1966.

[Question] Is it not time to turn the technical documentation over to some industrial enterprises? After all, they could produce industrial accelerators themselves if they are so necessary.

[Answer] This is a very difficult thing.

[Question] But why? After all, there is a demand for them. Who is to blame for the fact that industry has not mastered the production of accelerators? Is it a lack of interest or technological unpreparedness? Why has the academic institute been producing industrial accelerators for 20 years and the end to this is still not in sight? During these years certain ministries could have turned in the direction of producing this kind of technical equipment.

[Answer] Of course, we have not stood still for 20 years; the designs of the accelerators have been constantly improving. But industry actually has not set about producing them yet. What is the reason for this? In industry it is generally difficult to produce that which is required in a quantity of several units a year. The small series and the complexity of high-voltage items are two aspects which reduce the attractiveness of accelerators as a future product.

But here too we are gradually arranging contacts with the ministry we already mentioned--the Ministry of the Electrical Equipment Industry. The USSR Gosplan has come to a decision concerning the assimilation of the production of industrial accelerators at enterprises of this branch. We have now begun the introduction of the production of accelerators at the Sibelektroterm Association. The association is technologically prepared for the assimilation of these products. But many components are alien to it: electronic optics, irradiation units, and control elements.

It is presumed that the transfer of technology for producing accelerators will take place in stages. Initially let the production association assimilate only those parts and technological operations which it can handle most easily. For the time being the rest of them can be done by the institute's experimental production. If, for example, the Ministry of the Electrical Equipment Industry has ordered 15 accelerators, let the enterprises of this ministry do work which in terms of labor-intensiveness is equal to the production of this quantity of items and the rest will be finished by our institute. This, according to my idea, is planned introduction of industry into the solution to this problem.

[Question] But why must this introduction be smooth?

[Answer] From numerous contacts I have formed the conviction that production workers are afraid not so much of the volumes as of new technologies: it takes a long time to introduce them and a long time to learn them. Our experimental production, on the contrary, finds it difficult to increase volumes. As concerns restructuring technology, this is precisely our main specialization. Of course, with time industrial accelerators will be produced in plants, but, if necessary, the assimilation should be gradual.

[Question] Is it possible to predict the creation of a subbranch for producing industrial accelerators?

[Answer] A subbranch is going too far. One or two plants--perhaps with a volume of production of several dozen a year.

[Question] Is that your estimate of the demand?

[Answer] There are all kinds of demand. There is a demand which is determined according to the principle "It would be good," and there is the real demand that can be seen from the needs of the enterprises. The former is calculated by analogy with the leading industrially developed countries, and the latter is registered by the readiness of industrial enterprises to take over the production of these accelerators.

[Question] It would be more correct to call the second demand a false one.

[Answer] The first?

[Question] No, the second. There is a full saturation of the market because the consumer is not prepared.

[Answer] I would still call the first one, the demand on paper, a false one, when orders are submitted for the five-year plan without any responsibility. In fact the market is not prepared to accept this quantity of accelerators. Only a few enterprises are actually prepared to assimilate them—a couple of dozen or perhaps a hundred. And this is the actual demand.

[Question] All right, but why is the consumer not sufficiently prepared?

[Answer] This takes place to a considerable degree not because of a lack of knowledge of the technical side of the matter nor because of illiteracy, but because of complacency. A rule goes into effect: "To adopt the new will cost you more." These are the most general considerations. But there are also more concrete ones. The plant would be glad to adopt developed technology, but we are offering it an accelerator because we do not deal with radiation technology as such. That is already far afield from nuclear physics. We cannot simultaneously be specialists in grain, insects and the viruses that live on these insects, we cannot have a profound understanding of paints and varnishes, polyethylene and artificial leather.

In order to incorporate radiation technology successfully into the basic technological process, one needs specialists in the corresponding areas of industrial production. Two of the most successful applications of industrial accelerators--in the production of cable and at elevators--turned out to be successful only because enthusiasts were found in the branch institutes. The group that took the initiative in the All-Union Scientific Research Institute of the Cable Industry simply could not construct its own accelerator, but what to do beyond that was quite clear to them.

The cooperation proceeded with more difficulty with the Ministry of Procurements: there the workers had fewer skills in working with complicated technical equipment. Within the All-Union Scientific Research Institute of Grain and its Novosibirsk branch groups were created in conjunction with which we did the first experiments, first in Novosibirsk and then in Odessa.

[Question] Perhaps it would be expedient to create a multiprofile multibranch center for producing radiation technology and industry.

[Answer] Under the conditions of the branch structure of management such centers should be formed within each branch.

[Question] But the example of the heat-shrinking sleeves convinces us how difficult it is to overcome barriers between branches.

[Answer] This example shows how difficult it is for us to arrange our relations with the Ministry of the Chemical Industry. For this ministry in the future should be the largest consumer of industrial accelerators. But so far we have delivered only four to them, and only one of these is working well, that is, in a production program. The remainder are used as experimental and experimental-industrial installations. So the basic unsaid word regarding the construction of a plant for heat shrinkage sleeves was left up to the Ministry of the Chemical Industry. We shall hope for the best.

[Question] But at least within the chemical industry there should be your intermediary for the introduction of radiation technology, should there not?

[Answer] We simply could not convince the ministry of this and therefore we are trying to solve the problem of creating such a center through other means. First of all, we were decisively supported by the Novosibirsk CPSU Obkom. We submitted a suggestion to make one of the plants the center for radiation chemical technology, the breeding ground for new technological processes in the system of the Ministry of the Chemical Industry. According to the plan, 13 accelerators should be installed at this plant, and it is to produce several thousand tons of heat shrinkage sleeves for insulating petroleum and gas pipelines, various kinds of films and coatings.

Not so long ago the USSR Gosplan had an exhibition of the work of the Siberian Branch of the USSR Academy of Sciences. There representatives of science made a suggestion to create a center for radiation technology on the basis of the aforementioned plant. The Gosplan approved this suggestion. Now, relying on support from party agencies and the Gosplan, we hope to convince the Ministry of the Chemical Industry of the need for such a scientific production center.

[Question] It turns out that you have tried unsuccessfully three times to deal with the same authority.

[Answer] The problem is that it is necessary to reject certain products and to transfer certain ones to other plants. This is a lot of trouble. It is considerably simpler when everything remains as it is. Forcing people to change something frequently means forcing them to act in opposition to their interests.

[Question] Still there are many branch institutes in our country. Can we expect that at some time there will be a line of enthusiasts from these institutes coming to you for radiation technology? And what needs to be done for this to happen?

[Answer] Your question pertains not only to radiation technology. It is of a more general plane. On the whole I am an optimist, but optimism is inspired by decisions of the party and government, and particularly by recent decisions.

In order to increase interest in technical innovations it is necessary to resolutely eliminate anonymity and to form positive feedback: those who are working best should receive the best conditions for their further activity. Inseparable from this positive feedback is a demand of the time--greater independence for production collectives. These problems are frequently raised on the pages of EKO as well.

The high goals of fundamental science make it possible to create collectives of talented people who are involved in their work. Creative labor undoubtedly deserves encouragement, both moral and material. I agree with the opinion of many authors in EKO to the effect that the role of material incentives and its proportion in wages should be increased, removing the existing limitations on

the amounts of bonus payments. But it should be noted that even now the management of the scientific research collective far from always takes advantage of all the existing possibilities for the desired differentiation of wages of associates in keeping with the real contribution to the common cause. The existing proportion of the bonus fund is spent on simply increasing the average wages, on a certain amount of collective stimulation which, unfortunately, like the overall amount of the bonus fund, does not depend on the results of the work.

[Question] Do you wish to say that it is simpler and easier for the management of the institute to pay bonuses according to the principle of "a little for everyone"?

[Answer] I would not like to repeat that banality. It is better to say a couple of words about one of the objective factors that forces us to take a different path. It seems to me that in the sphere of science and scientific and technical progress the factor of the collectivity of labor is poorly taken into account, in spite of the fact that our socialist system and communist ideology orient us directly toward that. Invention work, for example, is totally arranged on the principle of individual incentive. The existing policy motivates an individual not for the success of the overall cause, but in filling out an application for the proposed invention as quickly as possible and receiving an author's certificate. Frequently even this person himself understands that his receiving an author's certificate will be of no benefit to the cause and he must fill out an immense number of papers in order to submit an application sometimes exclusively for the sake of one more entry in his notebook of scientific works and inventions.

[Question] And this distracts him from his real work?

[Answer] I think that the state prize is also largely an individual incentive. The collective represented by the specific prize winner is not stimulated by this and does not receive greater possibilities for further work.

It is important for the collective that is working best to have the best conditions for production activity, better equipment and so forth. Even monetary encouragement could be made an element of the production incentive if, for example, the collective "earns" an increased coefficient in wages. Let us say that for an important achievement each member of the collective receives a significant (20-30 percent) increment to his salary. This increment should automatically go into effect for a time that would orient the collective as a whole toward new production successes. And each one should feel this, from the manager right down to the cleaning lady.

[Question] There are probably no such systems anywhere yet?

[Answer] In science there is certainly not. The category is awarded not for the results, but frequently according to the departmental jurisdiction. And not for a period of time, but once and for all. But the most important incentive is the "increased" possibilities of further work.

[Question] Let us turn from general questions to their concrete manifestations. I should like to learn of some examples of technical solutions which were obtained as a byproduct during the creation of experimental installations and have turned out to be useful for practical application.

[Answer] We produce two series of industrial accelerators: the ELV, which operates according to the principle of an ordinary rectifier, and the IIIU--on the basis of high-frequency resonators. In each of them there are elements which exist only in experimental physics and they are quite unusual for industry. Especially unusual for production workers is the handling of a high vacuum and the creation of technical equipment with superhigh tensions.

[Question] In what respect have industrial accelerators improved during the time since they have been produced in the Institute of Nuclear Physics?

[Answer] They have improved in two directions: they have become more reliable and more powerful. We have gradually begun to understand what reliability is under plant conditions when the accelerator is controlled not by a physicist, but personnel who have undergone minimum training. In this respect we have accumulated a good deal of experience. The accelerators have become less expensive per unit of capacity. We began with accelerators with a capacity of 10 kilowatts, for a long time the standard was for machines with 20 kilowatts, but now we are also producing 100-kilowatt accelerators.

[Question] What does an accelerator with a capacity of 100 kilowatts look like from the outside?

[Answer] From the outside it is a tank about 3 meters high and about a meter and a half in diameter. It should be located in a small radiation insulated premise. Everything that is radiated should go through this premise: grain--along the transporter, painted panels--on stands, and cable goes through by itself. There is no radiation outside of these premises.

[Question] But perhaps a false saturation of the market could maintain high prices for industrial accelerators? After all, for experimental production in an academic institute reducing production costs is a tertiary goal.

[Answer] I do not think that the cost of the industrial accelerator plays an essential role. In the first place, the acquisition of each accelerator is supported by special financing from the corresponding ministry. Second, with current prices the time period for recouping the expenditures does not exceed a year. As compared to other kinds of new technical equipment the economic effectiveness of industrial accelerators is simply obvious.

[Question] We are discussing the results that have already been achieved, but what can be said regarding the future? What new technologies do you intend to introduce into the national economy?

[Answer] Under the 12th Five-Year Plan one of the most important tasks for us will be the development and manufacture of equipment for the generation of synchrotronic radiation.

[Question] What is that?

[Answer] Accelerators of elementary particles are divided into two classes--linear and circular. In the latter the magnetic field draws the accelerated particles out of the free linear movement and causes them to move in a closed trajectory. Under the influence of this kind of pressure like particles--electrons--lose energy on radiation, which is called synchrotron (SI) or magnetobrake.

We all know how sparks fly from a grinding wheel--on a tangent. Brake radiation is in the same direction. From the wheel of the accelerator along the tangent they make channels of synchrotron radiation.

The range of synchrotron radiation is broad. With a small amount of energy of the electrons most of the radiation is in the ultraviolet range. With increased energy the range expands sharply and most of the radiation is initially low-energy and then it becomes high-energy X-ray radiation. But the main thing is that the brightness of the synchrotron radiation is much (tens and hundreds of thousands of times) greater than the brightness of existing sources of X-ray radiation. The broad range of wave lengths and the immense brightness determine the richest possibilities of synchrotron radiation; almost every sphere of natural sciences is involved in this and is interested in experiments with it.

Solid-state physics and chemistry, material science in the broadest sense of the word and biology have been given a powerful new instrument for investigating their objects. By utilizing SI it is possible to conduct X-ray structural analysis of a specimen that is thousands of times smaller in weight and in a very short period of time. Thus biologists were able to use the X-ray method to film the process of the contraction of a muscle and thus make an important contribution to the understanding of the mechanism of this phenomenon.

It is difficult even to name all the numerous examples of the utilization of SI. This broad area of research is a side product from physics of elementary particles, the method of using beams going in opposite directions, for whose realization electronic accumulators were developed--the sources of SI.

[Question] But if such large, complicated and, of course, costly installations as your accelerators using opposing beams serve as the sources for SI, is it feasible to utilize this radiation extensively in other areas of science.

[Answer] Yes, you are right, we are speaking about equipment that costs tens of millions of rubles, and centers for collective use should be established to operate it efficiently. Such centers already exist abroad: five centers for the utilization of SI in the United States, five in Western Europe and three in Japan.

Such a center recently began to operate in our country in the Institute of Atomic Energy imeni I. V. Kurchatov. A small specialized accumulator of

electrons (source of SI) and equipment for the center were delivered and manufactured in our institute. But most of the work with the utilization of SI is still done by us. Here we have more than 100 groups not only of Soviet, but also of foreign scientific subdivisions and they are conducting research on SI, which is a "byproduct" of our "basic production"--work on physics of elementary particles. The users of SI work, as we say, "under parasitic conditions."

[Question] Can SI have any other applications besides scientific research?

[Answer] Yes it can, and very significant ones. The development of microelectronics, one of the main directions of scientific and technical progress, is accompanied by a continuous reduction of the sizes of elements of microcircuits, an ever larger number of which are located on a limited service of a small semiconductor crystal. From integrated circuits of microelectronics one moves on to large integrated circuits (BIS's, superlarge SBIS's), and so forth.

A barrier has appeared on the path to further miniaturization--the wavelength of light that is used during the process of the photoprint in the reproduction of microcircuits. Diffraction of light impedes obtaining imprints with sizes of elements that are comparable to the length of its wave. It is necessary to change over to sources of radiation with a shorter wavelength. But the intensiveness of the existing sources of X-ray radiation is small and not suitable for industrial application in the reproduction of microcircuits. Only SI with its immense brightness has turned out to be suitable for this purpose.

The scale of modern production of microelectronic equipment is such that a large enterprise of this profile can allow itself the utilization of such costly equipment as an accumulator of electrons intended especially for obtaining SI. The more so since in addition to the process of reproducing SI, apparently, it will be used for stage-by-stage control of the structure of crystals, which will help to sharply reduce the percentage of defective work, which is now discovered only in the final stages of the technological process.

[Question] What can you say about the long-considered plan of creating a Siberian center for SI?

[Answer] In the first place, the Siberian Center for SI already exists and is one of the largest scientific centers in the country for collective functioning of complicated and costly equipment. The more than 100 scientific groups outside of our institute, the regular all-union and international conferences, the schools and conventions on problems of the utilization of SI speak for themselves.

But you are right in saying that the plan for the creation in the Siberian branch of a laboratory for utilizing SI, which is equipped with a special electron accumulator, the source of SI, which has bunkers near this accumulator for conducting experiments and laboratory premises for preparing them has been discussed for a fairly long time and so far without results. Unfortunately, the limited resources of the Siberian branch for many years

have made it impossible to solve this problem, and the SI users must reconcile themselves to the inconveniences of the "parasitic" conditions and the extreme crowdedness.

In spite of the fact that among the hundred groups of SI users about 20 belong to institutes of the Siberian Branch, the possibility of this cooperation in our Akademgorodok is far from fully utilized. The structure of the Novosibirsk Scientific Center has an important feature. First of all, there is no single specialization or scientific monoculture here, which is typical, in particular, of Dubna or Pushchino. The lack of a unified orientation has its pluses and minuses, but the positive aspects are clearly greater. Researchers working in various areas of science, in contact with one another, and above all in the process of daily informal communication and the performance of joint work, learn about new methods of work. There is a mutual enrichment of the sciences with methodological innovations, which cannot but have a favorable effect on the process of scientific research as a whole.

[Question] Apparently the role of the Institute of Nuclear Physics, the largest institute in the Siberian Branch, within the framework of such creative cooperation is significant even irrespective of the problem of SI, is it not?

[Answer] Nuclear physics and physics of elementary particles is characterized by a high level of the utilization of electronic computers and other electronic equipment in the process of conducting experiments. The groups of SI users working at our institute have all the opportunities to borrow this culture, and we consider it our duty to contribute in all ways to this process, not backing away from the necessary material and labor expenditures. We would be glad to increase our interaction with our neighbors in work in radiation chemistry and the development of radiation technologies.

But there are also judgments about cooperation which remind me of the content of an article I read somewhere in one of the central newspapers. The journalist described how the designers of the design bureau which was successfully developing new potato harvesting combines were regularly sent to harvest potatoes by hand. It is possible to approach the interaction between the Institute of Nuclear Physics and other institutes of the Siberian Branch in the same way. Do you have a large experimental production? Let it do what is necessary for other institutes.

It seems to us much more fruitful to take a different approach, taking advantage of our specific experience. Another illustration is the example of our cooperation with groups of SI users.

Physicists working in our area of science are able to do more than just accelerate particles and create radiation beams. Various methods of registration of particles and the creation of various kinds of radiation detectors comprise a highly developed area of experimental technology. Thus especially for researchers who use our sources of SI we have developed and manufactured in several models positionally sensitive single and double coordinate X-ray detectors. In our institute we have formed a small group which is carrying out the development of this kind of instruments. The high

parameters of these detectors and the immediate connection with the computers, which one might say are built into the body of the instrument, have opened up for them other (in addition to the SI) areas of application.

One of the modifications of the detector was installed in the Center for Protection of Maternity and Childhood (Moscow) and is utilized for X-ray examinations, making it possible to reduce the dose of X-ray radiation to one-30th as compared to other available methods. We hope that a second instrument of this type will be used by Novosibirsk medics.

[Question] Does such a large scale of work of an applied nature not impede your basic research of a fundamental direction and is it still possible to consider this the basic one?

[Answer] The basic directions for the work of our institute, as before, are physics of elementary particles and controlled thermonuclear synthesis. We are trying to carry out our solution so that the total expenditures of all kinds on applied work do not exceed 25 percent of our resources. This is not so simple. Life is pushing us in the direction of increasing this figure and certain efforts are necessary in order for the 25 percent planned at the beginning of the year to end up being no more than 27 percent at the end of this year. The reason lies in the fact that applied research is simpler and, c:functionstandpoint of the present day, more necessary. But we understand that the very existence of the collective such as it is is determined by its basic tasks. An essentially greater orientation toward applied work will change the composition and the very nature of the collective, and it will be no different from the numerous scientific institutions of an applied profile.

[Question] What will be the institute's next step in research on physics of elementary particles? Is a large new idea being developed, one comparable in significance to the method of counterdirectional beams?

[Answer] Today's situation for installations with counterdirectional beams of electrons and positrons reminds one of that which existed in the 1960's for accelerators with an unmoving target. Again, beginning with a certain amount of energy, to double it means quadrupling the sizes and cost. The physical nature of these two obstacles on the path to increasing the energy of the collision of particles is quite different. In the 1960's this was a relativistic growth of the mass of the particle with a speed approaching the speed of light; in the 1980's the barrier to the development of circular accelerators with counterdirectional beams of electrons and positrons has been synchronic radiation. A catastrophic increase in its capacity with an increase in the energy of the particles forces one to reduce the sharpness of the turn in the path of the particles and, consequently, to increase the sizes of the installation.

For this reason the size of the vacuum chamber of our installation approximately coincides with the size of the running track around the stadium and the installation under construction in Geneva in the European Center for Nuclear Research (CERN) will have a perimeter of 27 kilometers and will cost almost a billion dollars.

The only way to avoid synchroton radiation is to change to linear accelerators with bundles of particles directed against one another. This was the last important idea of Andrey Mikhaylovich Budker. More than 10 years were spent on its development. By the present time all the principal problems have been solved. There were two main ones.

The first. The particles pass through a linear accelerator just once, and in order to gather the necessary energy here it is necessary to have a very high rate of acceleration. Otherwise the length, and, consequently, the cost of the accelerator will be incomparably large and there will be no advantage over the circular design. By the present time the institute has experimentally obtained the necessary rate of acceleration.

Second. In the installation with the counterdirectional linear bundles the particles meet only once and in order for this single meeting of a pair of bundles to have any results it is necessary to compress them at the point of meeting to very small sizes. Now on one of our installations the cross-section of the bunches of particles at the moment of meeting is only 10 microns. Calculations have shown that in the linear design effective work is possible only if the amounts of the bunches are measured in tens of a micron. Now there is no doubt that this goal can be achieved.

[Question] What should be the sizes of the new installation with linear counterdirectional bundles?

[Answer] We have submitted a proposal for the construction of a 10-kilometer underground tunnel for locating two accelerators that "fire" bunches of electrons and positrons against one another with an energy of 500 gigaelectron-volts. An important feature of the plan, which has the name VLEPP (counter linear electron positron bundles) is that, having begun construction from the place of the encounter of the bundles on both sides, it is not necessary to wait until the full length is constructed. Even the first third will make it possible to conduct research on energy that exceeds the energy of the Geneva installation I mentioned.

[Question] If it is true that in the first 3 kilometers of a linear installation you obtain energy that is more than on a 27-kilometer ring installation, is there any point in constructing the 20-kilometer ring tunnel which, I have heard, is now being constructed near Serpukhov?

[Answer] The circulation installation of the UNK under construction near Serpukhov is intended for research with heavy particles--protons and anti-protons. In this case, as distinct from installations with electrons and positrons, synchroton radiation cannot play any role. But the results obtained in these various installations are equally important and augment one another. Therefore the new Serpukhov accelerator should be constructed and constructed quickly, more quickly than the United States is constructing an even larger machine.

But victory in this international competition can be gained only by a radical new idea. Obvious ideas (such as increasing the radius of the accelerator)

are no good here. This is the typically extensive path of development. Competition for "whoever invests more money" is fairly pointless.

The idea of linear counterdirectional bundles, like the method of counterdirectional bundles at one time is, in our opinion, for physics of elementary particles the newest technology toward whose development party and government decisions are calling us in all areas of science, technology and industry.

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FUEL INDUSTRY FALLS SHORT IN WINTER

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[Article by V. I. Zorkaltsev, candidate of economic sciences, and Yu. A. Sharapov, scientific associate, Komi Branch of the USSR Academy of Sciences (Syktyzkar): "Not the Last Cold Winter"]

[Text] Why does the fuel and energy industry go into a frenzy every time the country experiences a cold winter? A fuel shortage, interruptions in electricity and heat supply for industrial enterprises, lower temperatures in the residential buildings were all observed during the winter of 1978-1979. These problems were manifested in an even more crucial form in the winter of 1984-1985. Can a lesson be derived from this? Solving these problems is, in our opinion, an essential part of the work for achieving the goal envisioned by the 27th CPSU Congress: to place the development of branches of the fuel and energy complex in the service of the task of steadily satisfying the country's needs for all kinds of fuel and energy.

So far the USSR Hydrometeorological Center has not dared to predict what next winter will be like. To be sure, in the summer and autumn people themselves guess at this (for example, from the berries on the ash trees). Each year central and planning agencies conduct special preparations for winter. But this winter passed and the result is this: once again these measures cannot be considered successful.

As far as we know the readiness of the fuel supply system (and also the systems for heat and electricity supply) for winter have not been discussed in scientific literature. On the other hand, the need for a supply of fuel in the event of cold winters is discussed in many scientific works. For a long time these problems were handled by associates of the Physics and Energy Institute of the Latvian SSR Academy of Sciences under the leadership of Dr of Technical Sciences Yu. Ya. Mazur. Similar research was conducted in the Siberian Energy Institute of the Siberian Branch of the USSR Academy of Sciences, in the Komi Branch of the USSR Academy of Sciences and in other organizations, and this has been the subject of more than one dissertation project. Unfortunately, up to this point this work is being done primarily on the "academic" plane. One can only hope that next winter will force management and planning agencies to address the research in this area and give it a more practical direction.

There are various kinds of winters. One will be warmer and another will be colder. For the European part of the USSR there are data from observations of the air temperature for more than 100 years. As an analysis of these shows, depending on the nature of the winter the expenditure of thermal energy (and, consequently, fuel) for heating one and the same amount of housing can vary in a range of up to +/- 20 percent of the average expected level. Today we are using about one-fourth of all the consumed fuel for heating. This means that the aforementioned deviations in absolute terms can be calculated in the tens of millions of tons of conventional fuel and can exceed the annual volumes of production of any of the country's coal basins (except for the Donbass and Kuzbass).

For Syktyzkar the winter of 1984-1985, judging from the total daily temperatures, was not the most extreme for the weather and climate zone of the south of the Komi ASSR. This conclusion is also correct for other central and northern regions of the country. As we know, there are sometimes many cold winters all in a row. A series of extreme winters was formed by the heating periods of 1939-1940, 1940-1941 and 1941-1942. For example, for the central regions of the European part of the USSR the indicator of the relative expenditure of fuel for the memorable winter of 1978-1979 amounted to only 80-90 percent of the value of this indicator for 1939-1941 and 1941-1942. To be sure, in certain cities the winter of 1978-1979 had record low temperatures for several days. This aspect is important for analyzing the reliability of technical systems for heat and electricity supply.

And so how does one prepare a fuel supply system for increased consumption of fuel in the event of a cold winter? The problem can be formulated in another way: how does one determine the efficient composition of means of reserves whereby one achieves a minimum of the sum of expenditures on the creation and maintenance of reserves and a minimum of harm to the national economy in the event of their shortage?

The matter is complicated by the fact that it involves preparing for a random, unpredictable situations which might not arise either in this year or in the next one. But the existing system of planning, with good reason, gives preference to determined methods of calculation. In the calculated plan this difficulty can be overcome by using probability methods. This is done in electric energy engineering when substantiating the required amount of the emergency reserve: they compare expenditures on creating reserve and the mathematical expectation of harm in the event of a shortage of generating capacities and handling capacities of electric power transmission lines. According to our estimates the deviations of the need for fuel for heating do not have a clearly expressed tendency toward increase or reduction. This makes it possible to use data from meteorological observations of past years to estimate the possibility of the various deviations in the future. The function of probability of deviations in the demand for fuel constructed this way for a large region (for example, for regions of the European part of the USSR or the country as a whole) makes it possible to change over to a quantitative analysis of the effectiveness of reserve supplies for the totality of possible situations, taking into account the chance of their actually occurring.

Losses, Visible and Invisible

It is relatively simple to evaluate expenditures on the creation and maintenance of reserves using methods of calculating adduced expenditures. It is considerably more difficult to do an economic evaluation of the consequences of a shortage of fuel. First of all let us note that a fuel shortage does not necessarily lead to direct economic harm, when the activity of the enterprises of the national economy is limited. In particular, there will be no such harm if the shortage is covered from special kinds of reserves: it is difficult to estimate in rubles, for example, the reduction of the level of health. There may be no direct harm to production if the shortage of fuel is compensated for by limitations in the nonproduction sphere --housing and municipal services, consumer and trade services, consumer and trade services, sports and cultural facilities, and passenger transportation. But such limitations inevitably lead to a deterioration of the living conditions. And so there is an increase in the number of diseases, the amount of free time decreases, labor productivity drops.... And as a result, this ends up not only with social harm, but also direct production losses.

In literature suggestions have been made to compensate for a fuel shortage by reducing the temperatures in the buildings. If the temperature in buildings is reduced for a month even by an insignificant amount of 1 or 2 degrees, then, for example, on the scale of the European part of the USSR this can produce a savings of 2-3 million tons of conventional fuel. The losses from such a measure can be estimated through the increased expenditure of electric energy. With such an estimate the losses turn out to be relatively small--about 50-70 rubles per ton of fuel that is saved.

Actually, in this case the population inevitably uses electric heaters for maintaining the customary temperature. The winter before last this was manifested clearly in the schedules of electricity supply in places where it was decided to limit the heat supply. Consequently, the savings on fuel is only apparent. It should be compensated for by an increased expenditure of fuel for the production of electric energy. Atomic energy stations should be used to the full extent when there is a shortage of fuel. But the coefficient of useful utilization of fuel is somewhat lower when producing electric energy than when producing thermal energy. And so it turns out that to carry out the suggestion under consideration can actually lead to an increase in the expenditure of fuel of approximately 20 percent of the volume which is supposed to be saved. Because of this, and also because of the indirect losses it is hardly expedient to count on a significant savings on fuel from housing and municipal services.

On the basis of the aggregate representation of the limitations in the various branches of the national economy, the proportional losses from a shortage of fuel can be estimated as the ratio between the national income and the volume of consumed fuel or through the proportion of fuel in the production cost of industrial products. In both cases we obtain an estimate of the proportional loss of 300-400 rubles per ton of conventional fuel. In addition to direct losses (the output of products has been curtailed), there are also indirect expenditures--on wages during the period of idle time, from spoilage of raw

material, the reduction of the speed of movement of circulating capital, and so forth.

But if one takes into account that the limitation of the activity of the enterprises generates associated consequences having to do with interbranch ties and is reflected for an extended period of time in the national economy, the estimate of the losses can be considerably more. Thus in electric power engineering the proportional loss because of the limitation of consumers of energy is estimated at 40 kopecks per kilowatt hour, if it is calculated as the ratio between the national income and the electric energy consumed in the country, or according to a more popular method of evaluation--60 kopecks per kilowatt hour. Let us note that according to data from certain ministries the ratio between the estimates of these losses and the volume of electric energy that is not delivered during certain winter months of 1984-1985 reached 1-2 rubles per kilowatt hour. From 1 ton of coal one can produce approximately 3,000 kilowatt hours of electric energy. Therefore the proportional loss because of the limitations on the consumers of electric energy as a result of the shortage of fuel is already estimated in an amount more than 1,000 rubles per ton of conventional fuel.

With large-scale interruptions in services it is fairly typical to have a situation where the complete losses greatly exceed not only the expenditures required for the production of these energy resources, but also the direct losses. As an example one can give the large emergency in the energy system of Sweden on 27 December 1983. Of the overall losses from the emergency which were estimated at 200-300 million krona, only 20 million were losses which were sustained by the energy companies.¹

The estimates of individual losses, conventional as they are, are useful and even necessary for analyzing other economic decisions. For example, in comparison to expenditures on production, exporting fuel cannot be regarded as a highly profitable measure. But this conclusion will already be questionable if the expansion of exports involves the risk of limiting the consumers within the country. One must know the amount of the losses when one substantiates the expediency of reserves and determines their optimal amounts. Otherwise only one, visible part of the losses to the national economy will be apparent—expenditures on supplies and reserves. And the other constituent--losses to the national economy because of the shortage of reserves--will make itself known only from time to time, in situations when there is no longer anything that can be done to avoid them.

From the estimates of proportional losses that have been presented it follows that the reserves and supply should be such that limitations on consumers of fuel arise as rarely as possible. For there not to be any doubt about the need to maintain reserves and supplies, however, even during periods when they are not being used, it is necessary to be able to calculate those unforeseen losses which will arise if one does not maintain reserves and supplies.

Reserves--The Path To Ensuring Reliability

Which reserve funds can be used to regulate deviations in the expenditure of fuel for heating? Above all, supplies. But up to this point when drawing up

the plans for fuel supply normatives of insurance supplies of fuel in the event of cold winters are not taken into account. The entire volume of operational supplies of boiler fuel (of consumers, in warehouses in the USSR Gossnab, in underground gas storage facilities, in the places of production) with a certain degree of conventionality can be divided into three parts: seasonal supplies, current insurance supplies, and supplies for regulation over many years. Supplies in the event of cold winters are included in the last constituent.

Each year during the winter period (first and fourth quarters) about 30-40 times as much fuel is consumed as in the summer period (second and third quarters). Almost a third of these deviations are compensated for by the increased deliveries of fuel during the winter period. Basically the increase in the seasonal fuel consumption is covered with supplies. Thus the seasonal supplies for the fall comprise about a month's volume of fuel consumption.

The total amount of the other two parts can be considered to be approximately equal to the level of supplies with which the system of fuel supply reaches the end of the winter period. Of these the current insurance supplies intended for regulating irregularities in deliveries and consumption of fuel within the day and within the week should comprise a volume approximately equal to the 3-5 days of fuel consumption. Supplies in excess of the amount of seasonal and current insurance supplies can be put into the category of supplies for longer-term regulation. These supplies can increase or be reduced, depending on the ratios in the increase in production and consumption of fuel. For example, on the basis of data (published in the reference book "The National Economy"), one can establish that at the beginning of the 11th Five-Year Plan the level of fuel supplies (in relation to the volume of fuel consumption) was one of the lowest in the postwar period.² The provision of supplies increased somewhat during the first 3 years of the five-year plan, but they did not even reach the 1975 level. And this is when the level of fuel supplies is an important indicator of the reliability of the fuel supply system and its readiness to cover possible disturbances.

Our suggestion consists in the following. The supplies for long-term regulations should be formed on the basis of normatives. This will increase the resistance of the energy complex to large-scale disturbances. In those cases when the actual level of supplies becomes lower than the normative special measures should be envisioned to increase it. And, conversely, if the level of supplies exceeds the normative, plan deliveries can be less even than the average expected level of fuel consumption.

For this regulation of supplies to be realistic it is necessary to have a solid foundation. This can be provided partly as a result of increasing or reducing the limitations on resources allotted to individual categories of consumers and also through maneuvering of the volumes of exports of fuel. But perhaps a fundamental solution is possible only as a result of maintaining reserve capacities in fuel production. For these capacities it is necessary to establish a policy of planning and management so that it will be possible to increase the volumes of deliveries of fuel during years when the level of supplies have dropped below the normative. And to do this it is necessary to reduce the production in years when the supplies exceed the normative level.

This plan for regulation has been realized in the form of a model which repeatedly imitates the processes of delivery, consumption, accumulation and development of supplies of fuel. The demand for fuel was given as a random amount with a function of the density of probability determined on the basis of meteorological observations. The calculations that were made with respect to the European part of the USSR show that when maintaining reserves in an amount of 4 percent of the volume of fuel consumption the net average annual effect will be about 1 billion rubles, as compared to a situation when there are no reserve capacities. The normative for supplies was taken as equal to the monthly volume of consumption (reserves and supplies here are considered with respect to the ratio to the volume of consumption of fuel only for individual periods). Here the proportional losses from the shortage of fuel were taken as equal to 350 rubles per ton of conventional fuel, and expenditures on the creation and maintenance of reserves and supplies are approximately equal to those made by the national economy for the production and storage of fuel.

Because of the sharp increase in deliveries from the eastern regions of the country to the fuel consumers in the European part of the USSR it is becoming crucial to create reserves of fuel production here. In this respect the Timano-Pechora energy complex is of interest: it has significant volumes of practically all kinds of fuel and this would make it possible to provide structural reserves as well.

Under the conditions of the general desire to utilize all kinds of reserves, the idea of creating supplies of fuel when there is a chronic shortage of it and also reserve capacities in fuel production seems absurd. But let us not be hasty. Let us imagine for a minute what would happen if there were no reserve capacities at electric power stations. Almost every emergency in the energy system would immediately affect us, the consumers: if a machine tool halted there would be no light or water in the buildings, it would be necessary to go up to the 12th story on foot, and so forth. Naturally, we would not agree to such inconveniences and therefore the availability of reserve capacities at electric power stations, one might say, are a compulsory measure. Nobody has any doubt about the justification for such a reserve which is brought about largely by the immediately appreciable loss from the shortage and output of electric energy, not to mention an emergency in the electric energy system.

In essence, this is a situation that has arisen in the fuel industry as well. The only difference is that the lack of sufficient supplies is not manifested immediately, but it is manifested especially crucially with the onslaught of a severe winter. If there have been several warm winters in a row the seed of doubt begins to sprout: Is it worthwhile to spend money on the creation and maintenance of supplies and reserves when we do not know if we will ever use them...and the next cold winter falls like snow on our heads, bringing immense losses.

FOOTNOTES

1. ENERGETICHESKOYE KHOZYAYSTVO ZA RUBEZHOM, No 4, 1984.
2. "The USSR National Economy in 1984," Moscow, "Finansy i statistika", 1985, p 55.

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SOLUTIONS SOUGHT FOR SUPPLY PROBLEMS

Novosibirsk EKONOMIKA I ORGANIZATSIIA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 5, May 86 pp 73-105

[Report on discussion in directors' club prepared by L. Shcherbakov: "Views From Inside and Outside"]

[Text] One of the most important issues in the activity of any industrial enterprise and, consequently, of the national economy as a whole, is material and technical supply, i.e. the provision of the production program with material resources in the necessary assortment and quantity, and at the necessary times. Its significance increases sharply in connection with the course toward intensification of the country's national economy. As General Secretary of the CPSU Central Committee M. S. Gorbachev pointed out in his speech at the conference of the CPSU Central Committee regarding questions of accelerating scientific and technical progress, "problems of the production infrastructure have been aggravated. The arrears of transportation, communications, material and technical supply and other branches lead to large losses.

"The immediate task is to mobilize organizational, economic and social factors, to bring order into everything and to improve the organization of production in order to provide for better utilization of that which the country has at its disposal." In carrying out these tasks a great deal depends on the material and technical supply agencies and on their orientation toward more complete satisfaction of the needs of industrial enterprises.

In recent years on the pages of the press and in statements from executives and scientists there has been repeated discussion of the fact that the system of material and technical supply lags behind the requirements of life. But at the same time, fairly little has been said about the positive suggestions: what must be done in order to change the existing situation.

A meeting in the EKO Directors' Club in Novosibirsk was devoted to these problems. It was attended by managers of industrial enterprises of the city, executives, representatives of the Gosbank and scholars. The meeting was conducted by managers of the Western Siberian Main Territorial Administration for Material and Technical Supply of the USSR Gosnab. The meeting was held in a warehouse complex for metal supply and sales, where the guests were shown the shop for sorting metal and the production services.

We are offering for your consideration an abridged record of the discussion in the Directors' Club and also the speeches by the representatives from the Institute of Economics and Organization of Industrial Production of the Siberian Branch of the USSR Academy of Sciences, who sum up the results of the conversation.

A Boundless Sea of Supply

In the country's national economy there are now more than 40 million positions on the annual plant products list. Of these 25 million are for internal industrial circulation. All of this immense mass passes through material and technical supply agencies. Take just one main administration of the USSR State Committee for Material and Technical Supply--the Western Siberian Main Territorial Administration. In terms of the volume of work performed it occupies seventh place in the USSR and serves businesses of Novosibirsk, Omsk and Tomsk oblasts. What is the scope of the operation of this administration?

A. P. Babanakov, chief of Zapsibglavsnabsbyt: It is fairly great. Thus the planned volume of sold products is 14,180,000,000 rubles. We serve 2,493 consumers, of which 1,165 are industrial enterprises. Industry and construction annually consume about 2 million tons of metal (not including the metallurgical plant imeni Kuzmin), about 5 million cubic meters of timber, 5,500 square meters of glass, 2,500 tons of cement, and 3,000 kilometers of cable products.

These volumes force us to work on strengthening the material base. The overall volume of internal capital construction is 9.1 million rubles and construction and installation work--about 5 million rubles. We do our construction with our own SMU. The warehouse areas have increased sharply in recent years. Now the area of warehouses is about 500,000 square meters (covered--190,000 square meters). The level of mechanization of loading and unloading and warehouse work in our main administration is 83 percent. In addition to the complex where we are now located we have created highly mechanized warehouse complexes for machine building products (near Novosibirsk, the Tomsk Universal Complex, and so forth. These are essentially modern, highly mechanized enterprises. According to the developments and designs of the NPO [Scientific Production Association] "NOTsnab" (Riga) more than 870 comprehensive jobs have been introduced for engineering personnel who are supplied with special organizational equipment and specialized furniture.

A branch computer center has been created. Omsksnab and Tomksnab have branch machine bookkeeping stations. A complex of tasks for controlling warehouse processes, including automated search and distribution of products, is being put into the computer.

Commodity supplies as of 1 January 1985 amounted to 132 million rubles, with a normative of 108.3 million. Moreover, a tendency toward increasing supplies is characteristic of the Gossnab as a whole. I think this is taking place because the enterprises are transferring their above-normative supply to us, that is, they are beginning to feel confident of supply.

V. V. Varonin, chief of the Metallosnabsbyt Complex, Zapsibglavsnabsbyt: It is not only the volumes of work that are great, but also the list of kinds of raw and processed materials that are delivered--this is a direct result of scientific and technical progress. During the past 5 years, for example, the number of types and sizes of metal products has increased from 8,000 to 14,000. And this is far from the limit.

Territorial Control of Material and Technical Supply and Territorial Organization of Production

I. G. Dubovskiy, deputy chief of Zapsibglavsnabsbyt: Anyone who has been working in the field of supply for a long time is well aware that the boundaries of the activity of the USSR Gossnab have expanded significantly in recent years. Being the successors of the sovnarkhozes which were abolished, the territorial Gossnab agencies have ended up being that unit in the administration of production where many important issues in the activity of the enterprises are concentrated: supply and sales of products, delivery of items under cooperation, control over the condition of accounting and storage of materials, observance of funding discipline, fulfillment of state assignments for economizing on resources.

The existing idea of supply as merely the distribution of resources among consumers is also changing. Although this is not taking place as rapidly as we would like it to. Both workers of the Main Administration and supply workers of the enterprises must remember that the main thing today is not simply to require raw and processed materials, but also to acquire the necessary amount of whatever is needed. The supply worker has not been passed by. He must think economically, in modern categories. We have in our system workers (and there are many of them) who when distributing raw and processed materials do not delve into the essence of their work. Sometimes they even try to give out more, if only they can avoid conflicts with representatives of enterprises. The increased branch norms for the expenditure of materials also contribute to this. But there are also examples of an economical, thrifty approach. For a number of years, for example, there is a critical shortage of one of the components. The Bereznikovskiy nitrogen fertilizer plant was regularly failing to fulfill its commitments for deliveries. Having studied carefully the technological processes in which this chemical is used at the Tomsk Bearing Plant, the specialists of the Zapsibkhimlegs nab Association recommended that it be replaced with liquid sodium nitrite which is not in such short supply. As a result, the need for crystal nitrite decreased to less than one-half.

A. P. Babanakov: In our work with the enterprises we try to utilize progressive forms. Thus the enterprises now obtain 350 million rubles' worth of raw and processed materials through direct ties. There are 41 enterprises in the region that have changed over to guaranteed supply. Sixty-one percent of the cargo is delivered centrally. And some of our subdivisions deliver more than 90 percent of the raw unprocessed materials to the enterprises this way. Within our Main Administration we are introducing a complex of additional services. These include unpackaging of liquid chemicals and cutting of paper and cable products. We plan to expand the volume of these services. On the territory served by the Main Administration we have organized the rental of unique equipment and technical equipment for measuring the composition of the air, the noise level and so forth, worth a total of 2.1 million rubles. This indicator is third in the country after Moscow and Leningrad. We intend to sharply increase the rental of instruments.

Additional Production Services--A Compass in the Sea of Supply

Participants in the meeting of the directors' club were interested in the experience of Zapsibglavsnabsbyt for sorting metal and rendering additional production services to industrial enterprises. The scope of the sorting of metal here is the greatest in the country. The experience in organizing this work is discussed by leaders of the Main Administration and its workers.

I. G. Dubovskiy: If one looks somewhat more deeply into the causes of the shortage of metal, in addition to the lack of discipline of individual suppliers who do not promptly fulfill their agreements, it turns out that most frequently the interruptions in the supply appear in places where there is a need for literally several tons, and sometimes hundreds or even dozens of kilograms of metal of a particular grade, brand, profile or size. It is precisely the small sizes of the orders that explains one-third of the idle time on the rolling mills at metallurgical plants in the eastern part of the country.

If they were to combine the orders of the enterprises and the construction sites of the entire region for rarely used types, grades, brands and sizes of rolled metal or those that are used in small quantities, the metallurgists would not have to adjust production so frequently. If the metal products were also sent to some single base, the scale of shipments, with rare exception, would correspond fully to the transit norms for dispatching.

But it turns out that even on the scale of a large economic region it is frequently difficult to find two or more clients whose need for a whole number of profiles, sizes and makes of steel, even for a year, would comprise one minimum transit norm. But what if we were to combine all small orders, not for one, but for several economic regions? At the large base which centrally receives metal from the supply plants, it would be possible to carry out this kind of sorting. This is shown by the work experience of the Novosibirsk enterprise for interrayon deliveries of metal products, pipes and scrap metal in semisorted form, which serves enterprises and construction sites of 15 regions of Siberia, the Far East, Central Asia and Kazakhstan. So far it is the only one in the eastern part of the country.

Now this is a large production and warehousing complex. The area of its buildings exceeds 18,000 square meters. Complete areas are well equipped for open storage of various types and grades of steel. Modern cranes make it possible to fully mechanize loading-unloading and internal warehouse work. At delivery warehouses we have a total of more than 500 lifting and transportation mechanisms in operation. The dispatch of metal after sorting has made it possible to accelerate the turnover of commodity supplies. With ordinary warehouse deliveries it was 5.1 times a year, and with interrayon deliveries it is 7.2 times. Metal received from more than 60 suppliers is sorted according to type, grade, brand and sizes into batches, depending on the orders of the clients, it is packed, including in special packaging for delivery in mixed railroad batches, and it is sent in combined cars to 36 enterprises. All they have to do is issue the prepared cargo to the client.

There are now sorting bases in Sverdlovsk, Chelyabinsk, Donetsk and Dnepropetrovsk. To "link" them into a unified system means to create the necessary prerequisites for on-the-spot solutions to many problems related to the still frequently arising shortage in various kinds of metal products in various regions of the country. This will make it possible to really control deliveries of metal products. The enterprises for delivering products of the USSR Gossnab system will become unique kinds of savings banks for material and technical resources will be equally advantageous to the "depositors" and the state.

M. G. Severgin, director of the Machine Tool Building Plant imeni XVI Partsyezd: There is no doubt that the idea of creating a complex that renders additional services is a great one. Our plant was one of the first to work with the services shop. But I must say that we are still not completely satisfied with its work. We have concluded agreements, coordinated delivery schedules and hoped that all the problems would be resolved calmly, without excess bustle, and the metal would come to us regularly and stably. But, unfortunately, the orders were not filled for a number of positions in 1984-1985. Thus during a number of months of 1985 we did not receive up to 19 kinds of metal and, as a result, that year we failed to fulfill the plans for preparations under agreements by 2 percent. Zapsibglavsnabsbyt should probably exert considerable effort in order to have this useful undertaking justify itself, so that there will be no interruptions.

Gossnab and Enterprises: A Unity of Partners or a Conflict of Interest?

The interrelations between enterprises and Gossnab agencies comprise one of the most important subjects discussed at the meeting. Indeed, the supply system was created not for itself, but in order to satisfy more fully the needs of the country's enterprises for end-processed materials. Among the numerous duties of Gossnab agencies, this is probably still the most important. And all other interests, above all departmental ones, should undoubtedly be subordinated to it. What are they, these relations? What suits the partners and what does not?

1. Efficiency of Supply

V. V. Voronin: The managers of enterprises expect greater efficiency from the supply agencies. What slows up the rhythm of supply? We should like to take note of the following aspects.

First of all we are not satisfied with the work of automotive transportation. There is a critical shortage of trailers. Five to 7 years ago we had a good practice, whereby they were left at the base. In order to provide for more intensive delivery of metal, the automotive transportation workers should leave us at least 10-12 trailers. Unfortunately, they still do not grant us this opportunity.

But even at the enterprises the organization is not at the proper level. Now 80 percent of the plants and enterprises cannot receive metal on the second shift because there are no service personnel and the mechanisms are not working. Automotive transportation workers are already making complaints since they cannot use their transportation 24 hours a day or even on two shifts. And therefore when we conclude agreements with the enterprises for deliveries, one of the central points should be providing for unloading from 8 in the morning until midnight. The machines frequently stand idle at the enterprises on the first shift as well, and sometimes they return to the base without being unloaded. In this case we are breaking our agreement with the enterprise.

The second problem that must be discussed is the interrelations with the railroad businesses. The associations and enterprises of rail transportation were created long ago, under the sovnarkhozes, and then they were transferred to the Ministry of Railways and, one must say, now they absolutely do not correspond to the tasks that face them. These associations will not take on full responsibility. I shall give one example. When imported materials are brought to us on the railroad, the weigher should examine and certify the cargo. The weigher must be a worker of this business for otherwise he is not responsible for protecting the cargo. As a result, the cargos go unused for a long time while waiting for this examination. Relations with railroad workers are difficult, which in the final analysis leads to losses in time and the quality of the work.

What, in our opinion, is the solution? We are now engaged in the substantiation, following the example of the Ilichev workers, of a unified complex in which four units participate: supplier, consumer, transportation worker and base. They must be joined together by a single contract which would make each unit completely responsible for the final result of the work.

We are absolutely not satisfied by the level of centralized delivery of materials to the base because of the fact that there is departmental separation of those who deliver and those who order the metal. As of today the provision of automotive transportation for centralized delivery reaches 80 percent or, at best, 90 percent of the need. But transportation workers have their own solutions: transportation is taken away first and foremost for agricultural work. This is especially appreciable during the third quarter of the year, both for us and, of course, for the enterprises. Additionally, the

trucks that are allotted for shipping metal are not specially equipped. We are even given logging trucks which are not equipped with the devices necessary for rapidly loading and unloading metal.

Question: Are external factors the only way to explain the inefficiency of supply? After all, you did not always fulfill your agreements for centralized delivery either. It frequently happens that we send our vehicles to the base and they are returned empty....

A. P. Babanakov: Of course there are also internal reasons. In some ways we are inefficient, and, finally, sometimes it is simply difficult to deliver the necessary batch of metals from the warehouse. This is precisely why we attach such great significance to the construction of the warehouses and their technical reequipment and construction. In the near future we shall carry out reconstruction of Metallosnabsbyt. We will lengthen the platform by about 300 meters and equip it with gantry cranes--which will increase the efficiency of the work.

Yu. G. Shelyukhin, candidate off technical sciences: I think that automotive enterprises should be assigned to supply organizations for control of material and technical supply and should change over everywhere to centralized delivery of all cargoes. Then even if transportation is diverted to assist agriculture, there will be a possibility of planning this ahead of time. It is also necessary for territorial management of material and technical supply to have transportation for interurban shipments. Then it will become possible to batch the trains, knowing the need of the enterprises in the oblast. This is very important, since the volume and number of these shipments is increasing with each year. With centralization of shipments the enterprises of the city should help the territorial material and technical supply administration by sending even their own workers on trips for shipping products in to enterprises as well as control administrations. I think that material and technical supply agencies should have limits on all kinds of transportation.

This system would provide for a colossal savings as a result of eliminating the endless idle time of transportation means belonging to the enterprises because of late or incorrect filling out of documentation, because of lines, poorly timed provision of loading and unloading mechanisms, and so forth. In this connection, I think that it would be incorrect to pose the problem this way: since the enterprise has not unloaded the vehicle promptly, products should not be delivered to it centrally. Situations vary and there are even those in which for various reasons it is actually impossible to unload the vehicle. Therefore it is necessary to pose the question this way: The enterprise has delayed the unloading of the vehicle--the Gossnab finds it, yet nonetheless does not take away centralized deliveries.

2. Excessive Number of Supply Units

G. Ye. Kolonda, candidate of economic sciences: Today we visited only warehouses of Metallosnabsbyt, but even from this one can see how much progress our Main Administration has made. Once you have created such capacities and a qualified staff, the majority of cases having to do with

material and technical supply have to be resolved here, on the spot, without going to Moscow. It seems to me that it is necessary to reduce the number of administrative units in supply: plant--Main Administration, in the Main Administration--Glavsnab, and then Gossnab. I think that the enterprises should be assigned directly to territorial main administrations.

A. P. Babanakov: The history of this issue is this: supply and sales organizations of the branches were created with the generation and development of branches, trusts and main administrations. When a new agency of the national economy was created, the USSR Gossnab, which was called upon to handle material and technical supply and which included territorial main administrations, most of the branch supply organizations were eliminated. But not all of them. Then this was associated with the lack of objective conditions--the Gossnab was still too "young" a branch to take on the full volume of functions--and also to the lack of the proper material base in our branch. Now all of this has been created. But the parallel supply organizations have remained, and it is very difficult to eliminate them. As soon as one enters discussions about this, naturally touching upon somebody's interests, there are a mass of justifications of the need for the existence of these administrative units. And the number of them, I can say without exaggeration, is immense. These include organizations for energy engineering, construction, divisions under obispolkom, organizations of river and rail transportation. And in the construction administration there are eight of these institutions which are operating in our region, in the Ministry of the Petroleum Industry--forth, and so forth.

Question: But what is the economic effectiveness of their activity as compared to territorial Gossnab administrations, yours for example?

L. N. Veselkin, chief of the division for organization of material and technical supply and automated control systems of Zabsibglavsnabsbyt: as is shown by calculations conducted in 1980 by the USSR Central Statistical Administration and the Scientific Research Institute for Material Supply on the basis of a one-time accounting for departmental supply and sales organizations existing in the country, for one supply organization in the system of the USSR Gossnab there were an average of 20.3 million rubles in warehouse sales, while in the supply and sales organizations under departmental jurisdiction this figure was only 5.7 million rubles. One worker in the state system of material and technical supply provided warehouse sales for products for production and technical services through enterprises under product deliveries in an amount 2.2 times greater than in departmental supply and sales organizations.

An analogous pattern is also confirmed by the results of a one-time accounting for supply and sales organizations (conducted by the USSR Central Statistical Administration in March 1985) located in the Western Siberian economic region. Thus while in supply and sales organizations included in Zapsibglavsnabsbyt the average volume of the overall wholesale sales per one worker is 959,700 rubles, the analogous indicator in the majority of departmental supply and sales of subdivisions taken into account does not exceed 150,000-200,000 rubles. This indicator is especially low in the Novosibirsk cost-accounting base of the MTS Linen Cooperative Association of the USSR Ministry of the

Textile Industry--28,600 rubles, the base of the MTS Novosibirskprombuz of the RSFSR Ministry of the Fishing Industry, the base of the geology administration of the RSFSR Ministry of Geology and so forth. For more than 45 departmental supply and sales subdivisions this indicator does not exceed 50,000-60,000 rubles. There is also a great disparity when it comes to other indicators, for example, the level of expenditures on circulation per 1 ruble of sold products. In departmental supply and sales subdivisions it is 3-5 times higher. We are far ahead of departmental supply and sales organizations of the region with respect to the volume and structure of commodity supplies, commodity turnover, machine availability, and volumes of lifting-transport and mechanized work that are performed.

An analysis of the results of the census shows that not counting supply and sales organizations of Selkhoztekhnika, Selkhozhimiya, and the RSFSR State Goskomnefteprodukt and a number of individual ministries and departments in the Western Siberian region, as of 1 March 1985 there were 118 departmental organizations operating in parallel and duplicating one another which were included in 37 ministries and departments. In 1984 they sold industrial products in a volume of 520 million rubles, including 289 million rubles through warehouses and stores. The number of workers was 8,214 and the output per worker was 63,300 rubles in wholesale sales and 35,200 in warehouse wholesale sales. At the same time seven supply and sales organizations of the Zapsibglavsnabsbyt system achieved an output of 617,700 and 223,500 rubles. The overall wholesale commodity turnover amounted to about 1.6 billion rubles, including 580 million rubles of commodity turnover through warehouses and stores. The overall number of workers was 2,596.

Considerable and frequently incomplete sets of residuals and supplies of commodity and material values are formed and remain in departmental supply agencies, and they are taken out of economic circulation for a long period of time. In a number of cases their delivery and sales are carried out by inefficient and economically ineffective shipments with large transportation expenditures. Two-thirds of the products that are sold and practically 100 percent of the products list of the USSR Gossnab are received by the departmental agencies with the help or directly from enterprises for delivering products in the system of the Zapsibglavsnab with repeated trans-shipment. And since the products that are received are sent to the enterprises for their own system, there are three and four trans-shipments which increases labor intensiveness and the cost of handling.

Why do branch agencies located in Novosibirsk engage in supply of consumers in Khabarovsk or Kamchatka, with extra transshipments of cargo if they have their own territorial supply agencies? Moreover, their needs, as a rule, are very small. Who needs double or triple accounts, as is frequently the case now when for obtaining one and the same kind of cargo reports are made both by the territorial administrations of Gossnab (which receive it on the railroad and tranship it to the branch organizations) and by the branch organizations? Recently there has been a constant increase in transit norms for shipping cargo (metal--from 62 tons to 86-96 tons, and in the future--up to 124 tons). Cargo flows are increasing, speeds are increasing on commodity trains which frequently move faster than passenger trains, and routes for their movement are being developed scrupulously. Consequently it is necessary to reduce the

number of trans-shipments. But one of the ways of achieving this is to reduce the intermediate administrative units.

Calculations done by Zapsibglavsnabsbyt show that the concentration of only 42 departmental organizations located in the region in the system of the USSR Gossnab would make it possible to reduce inefficient warehouse turnover by 45 million rubles and, as a result of concentration of commodity resources and increased assortments, would provide for more effective and maneuverable utilization of financial, labor and material resources and would cut warehouse, transportation and administrative expenditures almost in half. In our opinion, territorial main administrations of the USSR Gossnab should take full responsibility for the functions of departmental supply and sales organizations and, on the basis of concentration of commodity supplies, create a unified mobile "commodity bank" for the country.

Yu. G. Shelyukhin: I frequently go on business trips and see how many "accumulators" we have. You arrive at the airport an hour early and wait to be registered, then you wait for the customs inspection, after the inspection again an accumulator, again you wait, you approach the stairs and again you wait. The situation and supply is very similar to the one I described. Accumulators in the form of various kinds of offices exist through almost the entire supply route. Each year there are more of them. Now, for example, Novosibirsk is creating a new supply and sales organization. Why? In order to create it is necessary to expend funds and construction materials, to take vehicles away, and all this is to the detriment of the enterprises, but so far it has produced no appreciable assistance. It would be easier for everyone to work if they did not increase the number of various kinds of offices. And the resources that are expended on creating them should be concentrated in a single pair of hands--the territorial administration.

Response: Correct! It will be less complicated to solve production problems and we will have to fill out less paperwork.

Ye. P. Govzman, general director of Inopenkoobyedineniya: How many organizations do you think supply our association, whose branches are located in five oblasts? Let us try to count them: Zapsibglavsnabsbyt, Kuzbassglavsnabsbyt, Tyumenglavsnabsbyt, the Ministry of the Textile Industry, and Rostekstilglavsnabsyrye (there is such an organization under the ministry which supplies raw material). Selkhoztekhnika supplies us with spare parts for automotive transportation. Construction materials are provided by Soyuzglavkomplekt and Soyuzkomplektavtomatika. Equipment for kindergartens and dining rooms is provided by the trade administration.... All told, there are 11 organizations! Imagine the position of our association, my deputy and the chief of the supply division: it is necessary to literally go to every one of these firms. And each of these organizations has its own normative base while the UMTS [Administration for Material and Technical Supply] or the ministry in general has no normative base. In any case, it has no effect on us. For the same repair purposes we are sometimes given 10 carloads of cement and sometimes just one. We have received metal depending on how much is left at the base and not on how much we need. I shall give an example. We have 140 motor vehicles. The plan for cargo shipments for 1985 was 5.4 billion ton kilometers. According to the letter from the USSR Gossnab the expenditure of

gasoline is 163 tons per 1 million ton kilometers. This means that in a year we should obtain 700-800 tons of gasoline. We are given 450 tons. And where are we to get the rest of it? They say that we are supposed to get it from agriculture since we are shipping cargo for it. But the agricultural workers, of course, do not give us any gasoline. And so half of our motor vehicles stand idle without fuel in all 32 enterprises of the association that are located in Western Siberia.

3. Lack of Clarity of Functions--Weak Responsibility

G. Ye. Kolonda: The next question we should like to discuss is the division of the products list between the Gossnab and the Gosplan. Sometimes one finds positions in the plan which "hang" between these agencies and there is no way to find out which of them can and should help. I think that these questions of the products list should fall within the competence of the Gossnab, and for us in Novosibirsk--Zapsibglavsnabsbyt. The imprecise distribution between these two departments forces the enterprises to replace materials or refuse deliveries. Previously this could be done 45 days beforehand, and now it is 60. But sometimes the plants, naturally, refuse to accept the rejections, demanding the delivery of those components which they were supposed to receive. The case is brought up for arbitration, time passes, and the supplier produces and delivers products which nobody needs. This is a waste of immense amounts of state money. It is necessary to resolve the problems in such a way that when replacing items on the products list for the supply enterprises the client still receives what he needs. There are cases in which individual materials are not allotted for many years, even though the supplies have been allotted. For example, Kapron bits and tape. All problems involving these are solved at once: the plant workers go to the plant which produces polystyrene, make an agreement and obtain these materials. But this is not the point! Either one should eliminate supplies through the Gossnab or improve it. The Gossnab should be placed in a responsible position and those materials envisioned in the state plan and for which norms have been set should be mandatorily granted to the enterprise when it enters into agreements with any agencies: either remove the plan or produce the materials!

It is time to bring order into this question. The enterprises are required to have 100-percent fulfillment of the plan with respect to the products list. But for the Metallosnabsbyt, for example, it is sufficient to fulfill the plan for sales--and everything is in order. But what about the products list? It is necessary for the agreement between the enterprise and the supply agencies to have the force of law.

A. P. Babanakov: Yes, the situation actually is this: there is a products list which is distributed by the Gosplan and one that is distributed by the Gossnab. With respect to our positions the supplies are "defended" locally by the managers of the enterprises and workers of Zapsibglavsnabsbyt. As concerns the Gosplan products list--metal, timber, cement and so forth--here the "chain" of interrelations is this: the ministries "shake up" relations with the Gosplan, and after that they allot the funds to the enterprises. As concerns our products list, recently the number of complaints here has decreased sharply. We have the right to solve all problems locally. But we cannot do this with the Gosplan products list.

Question: But can you not turn it over to the territorial agencies and see what happens?

A. P. Babanakov: As you can understand, I do not have the authority to resolve this problem.

Yu. M. Kisilev, director of the experimental plant of the Siberian Branch of the USSR Academy of Sciences: We have practically no sense of the responsibility of supply agencies for the results of their work. Everything is based on good relations. Of course this is an abnormal situation. The work of an entire collective should not depend on anybody's good relations.

G. Ye. Kolonda: Indeed, too much now rests on good relations. This is not to the advantage of the enterprises. Frequently the Gossnab puts departmental interests in first place and not the interests of the overall cause. At one time many plants decided to take advantage of guaranteed comprehensive supply. They drew up drafts of the agreement, but the Gossnab demanded that the enterprises have a certain number of workers, engineers and technicians. But these had already been established and the staff lists had been passed on. But who would be working at the enterprise?

I. M. Selivanov, director of Olovozavod: Today we no longer speak about work for economizing on material resources. But I shall myself to express a couple of ideas about this. One must say that the provision of materials for the combine is generally proceeding in a normal way. But there are still difficulties in providing tin concentrate. At the combine a great deal of significance is attached to questions of efficient utilization of material resources. From tin raw material we extract 12 other nonferrous metals in the form of compounds or individual elements. The coefficient of the utilization of raw material is 0.95 percent, which is good for our branch. More than 90 percent of the water supply is recycled and we have constructed dust removal installations which make it possible to remove valuable components, to protect the environment and to salvage heat from gases. As a result of the utilization of secondary energy resources the combine will save more than 30 percent annually. The boiler has been changed over from fuel oil (and it consumed about 15,000 tons of fuel oil) to gas. But we must save on both the initial raw material and processed materials, and use them for their intended purposes with more thought and efficiency. But take a look around the back yards of any industrial enterprise. Equipment, spare parts and other valuable materials, even refractory materials and brick are basically left out in the open. And they will remain there until the branch and interbranch agencies, including the Gossnab, devote the proper attention to the construction of warehouses, storage spaces, and covered areas. In the majority of cases even if something is being constructed it is on the personal initiative of the deputy directors for material and technical supply or the chiefs of the material and technical divisions. Centralized work is being done poorly in this respect.

Ye. P. Govzman: Two years ago an order came down from the minister which discussed the need to construct warehouses using funds for capital repair. All right, we will find the money (1 million rubles) for these warehouses, but

we still need metal and cement. They cannot be constructed without the help of the Gossnab.

I. M. Selivanov: And another thing. Through the chain of command of the branch ministries and the Gossnab we have received assignments for reducing the expenditures on materials by a certain percentage. We now have 15-20 of these positions. But they are not always established on the basis of analysis. Savings should also be reasonable. Each year we use in production more and more raw material that is poor in its content of nonferrous metals. And the norms for the expenditure of materials and electric energy, as a rule, do not take these changes into account. It is necessary to resort to overexpenditures of these. We must react to these changes promptly.

M. G. Severgin: Today we learned that the Main Administration intends to develop its own powder metallurgy. But is this necessary? We have a section for this at the plant. Perhaps it should be expanded and loaded on two to three shifts in order for it to work to fill orders from other branches of our region as well. And will you handle supply and sales as is envisioned?

Response: This is a very valuable suggestion!

M. G. Severgin: I think that such things should be developed on the basis of some enterprise and it should be loaded with orders. The more so since we also have the specialists. After all the Gossnab has somewhat different functions. We should not replace one another, but to interact with one another is a different matter.

4. System of Priorities: And If One Has Remained Outside It?

Question: When resources are being distributed why does the agroindustrial complex frequently stand between the Gossnab agencies and the enterprises. They refuse to give us certain materials, blaming this on the critical need for them in the agroindustrial complex...

A. P. Babanakov: Now the fact is that it is included on the priority list for deliveries.

Ye. P. Govzman: Our association is also a member of the agroindustrial complex but for some reason we are not included on the priority list for deliveries. And therefore we receive rolled metal from the same metal base and not until the end of the year. Last year we received 9 tons of metal of our 70 tons of annual allotment on 28 December. Is this the way it is supposed to be?

N. D. Matveyev, general director of the Novosibirsk Sewing Production Association Sorevnovaniye: Perhaps I am mistaken but I have the feeling that in many regions of the country the light industry enterprises are cut short in material and technical supply as compared to other branches of the national economy. This is manifested in everything. Our enterprises are in a very difficult position with respect to labor force. There is especially a shortage of seamstresses, and the outflow of personnel is not decreasing. Therefore we try to devote as much attention as possible to retaining

personnel. Now we are constructing dachas by the internal financing method. Previously this initiative was welcomed at all levels. Now it is not; apparently they have decided to limit the initiative of the managers so that he will not try to rectify the existing situation. But is it necessary to sit with our hands folded in such a difficult situation as the one we have in our branch? Materials are needed for construction. Where will we go, Aleksey Petrovich, other than you at the Main Administration? But our Main Administration does not solve our problems, and our ministry does not either. Practically all the materials are allotted to us in extremely small volumes. For example, we are given only 200 kilograms of electrodes. We now have large buildings and six production sites in various cities. The scale is large. I think that there should be no problems or issues that are too small for the Gossnab. It is necessary to approach any problems from the standpoint of the state.

5. Initiative and Independence of the Manager: Perhaps They Have Become Superfluous?

N. D. Matveyev: I think that unless we untie the hands of the managers we will end up in a very difficult situation. Zapsibglavsnabsbyt should probably have operations funds which could be used if the enterprise ended up in a difficult situation. And another thing: it is now prohibited to dispatch materials without funds. This ties our hands when there is a constant shortage of many kinds of raw and processed materials. It would be hard to find a manager who would squander his fund materials. But sometimes some things are required immediately even for technical safety, and we have a right to trade raw materials which are not in such short supply for us in order to acquire them.

G. Ye. Kolondav: The solution discussed by N. D. Matveyev is even harmful, especially from the standpoint of efficient utilization of specific materials and other materials that are not in short supply. Let us assume that the enterprise had accumulated some special product, for example, cathodes for a movie projector, and these could not be sold. But there is a whole carload of them in one place. These materials cannot be liquidated. Since technical equipment is developing so rapidly, within a couple of years not only kilograms, but even individual units will not be purchased by anyone.

6. Material and Technical Supply: Does It Accelerate Scientific and Technical Progress at the Enterprise?

I. N. Selivanov: A shortage of raw materials, processed materials, reagents and metals holds up scientific and technical progress at the enterprises. We should probably have a working stockpile of raw and processed materials for the introduction of new developments. We wish to deal with these problems and life is forcing us to do this, but it is so difficult, and frequently even impossible to manifest initiative!

The practice that exists as of today in material and technical supply at industrial enterprises actually does not contribute to accelerating scientific and technical progress. Just try at some time in the middle of the year to make a change in the technology of production or install a small industrial

device for which you have not previously ordered reagents, materials and equipment. You will immediately come up against an impenetrable wall of limits and funds. In the introduction of a measure the expenditures for which are recouped in a couple of months will have to be put off for a year and a half or 2 years: It is necessary to wait until the beginning of the year for the "order" campaign so as to order the necessary equipment and materials for the following year.

On the scale of the country or individual regions there are no special supply agencies which could help an enterprise in such situations. It would seem that the USSR Gossnab should work out the problem of the creation of a way of supplying such organizations in the system. Attention should also be devoted to the expansion of small-scale wholesale trade for the sale of materials and equipment to the enterprises. This will help to a certain degree in solving supply problems that result from a suddenly arising necessity. After all, one sometimes speaks about the acquisition of a couple of single units of small electric engines or reduction gears, the retail price for which ranges from several dozen to several hundred rubles.

Yu. G. Shelyukhin: In the last year of the 11th Five-Year Plan many enterprises produced basically products developed during the same five-year plan. This bears witness to the growing rates of renewal of the products list. This tendency with an increased introduction of the achievements of scientific and technical progress is becoming typical of all branches of the national economy. With an increase in the rates of renewal there is a reduction of the time during which various items are produced which, in turn, leads to a reduction of the volume of orders for various kinds of materials and a sharp increase in the numbers of these.

In the interests of scientific and technical progress it is necessary to be oriented toward the fulfillment of orders for small batches from the enterprises. This issue should be resolved in principle. At the highest level. It is precisely through the prism of the solution to this problem that one can look at the development of the services for material and technical supply. Unless this is resolved there can be no serious discussion of a strict regimen for economizing on materials.

Yu. M. Kiselev: I completely with Yuriy Grigoryevich. I shall give this example. Each year 80 percent of our items change. The positions we win in science and technology depend on how rapidly we are able to change over to the production of new items. And, of course, material and technical supply plays far from the last role here. But it does not resolve many of the issues in the way that the tasks of the modern day require. We should like for special consideration to be given to material and technical support for experimental and single-unit productions, where the replaceability of items is very great and on which scientific and technical progress depends to a decisive degree. But we should not spread out the solution among newly created special offices, but concentrate everything in the hands of territorial administrations of the USSR Gossnab. For us this is Zapsibglavsnabsbyt.

G. Ye. Kolonda: I think that support for scientific research and experimental design work will improve if we develop stores and wholesale enterprises for

trade in small batches. They should have everything, especially in a city like Novosibirsk where divisions from three academies, more than 100 scientific research institutes, and a powerful and diverse industry are in operation. It is necessary to conduct quarterly wholesale trade fairs so that all enterprises will participate in them, and then we will be able to introduce order. It is also wrong for us to allot batching items to the enterprises only once a year. We must also put an end to this. Batching items should be ordered once a quarter. The USSR Gosnab should probably be thinking about this.

7. Oh, But That Is Patronage! But Is That All It Is?

I. M. Selivanov: I shall discuss one issue which at first glance does not seem to pertain directly to our discussion for today. But this is only at first glance. The enterprise is forced to divert a certain part of its material resources with patronage needs: rendering assistance to schools, kolkhozes and so forth. Many assignments also come in from local management agencies. Yet it is difficult for the management of enterprises to render assistance to those under their patronage because of a number of decrees that limit their latitude with respect to the utilization of funded materials. There is no legal basis for this. We have two sovkhozes under our patronage which we could render assistance in construction, and they need this.

A. P. Babanakov: You may help all you want! But this can be done only with savings on material resources and not to the detriment of the production program. And you yourself do not want to do anything to harm it. It is another matter if because of patronage assistance there are various violations, and we do come up against these: the head bookkeeper writes a resolution to allot the sovkhoz particular materials. And this sovkhoz is not under its patronage.

Question: But how does one fulfill the assignments from local agencies which are sometimes very burdensome for the enterprise?

A. P. Babanakov: Local agencies are also guided by decrees and they must be fulfilled. And they come to us in the main administration for assistance. The city has grown, it has 1.5 million residents, but the infrastructure has remained at the level of the 1960's. Who will increase it? Of course, there are contradictions when solving these problems. But the only legitimate path to such assistance is to provide it as a result of economizing on raw and processed materials.

I. M. Selivanov: This is hardly realistic. Each year, in keeping with a decision of the oblispolkom, we allot a million and a half rubles for construction of oblast roads alone. But we also need materials resources. If this matter were legally reinforced it would be easier for us.

Yu. G. Shelyukhin: And is it really just the businesses under their patronage that are demanding assistance from the enterprise today? Everyone who is going anywhere is asking for something.

Since the roads are closed to cargo transportation because of the harvesting and planting campaigns, the enterprises go to the highway administration. They listen to them there and then ask: What will you give us? And this has become widespread!

Quite recently the enterprises received a clarification that they have the right to help the kolkhozes under their patronage. But if there are kolkhozes this means also schools and other organizations. But I completely agree with Ivan Mikhaylovich that this explanation does not account for all of the difficulties. A very large amount of work is done under decrees from the rayispolkom. Let me give this example: in 1984 one of the enterprises of the city laid 2 kilometers of heating line in a residential rayon with all of the outlets and throughout the winter it kept a brigade which worked to service it. In brief, it is necessary to decide on the very highest level what should be done with these assignments and at whose expense they are carried out and using which resources. Otherwise everyone carries them out in his own way and there is arbitrariness.

G. I. Loginov, chief of the Installation and Technological Administration: Another consideration which must be discussed: It is necessary to arrange more rapidly for providing the population with paints, construction materials, linoleum, that is, materials, instruments and accessories for repairing housing and in the manufacture of odds and ends through retail trade. Directly related to this is the process of bringing order into the utilization of resources at enterprises and sharply reducing violations in the utilization of these materials as well as improvement of the sociopsychological climate in the labor collectives.

8. Above-Normative Supplies: Various Views on One Problem

S. A. Baranovskaya, chief of the Division for Credit for Heavy Industry Enterprises of the Novosibirsk Oblast Office of the USSR Gosbank: Today there have been many people speaking about material and technical supply, but nobody has mentioned financial support. Yet the role of Gosbank credit in the formation of circulating capital for the enterprises of the oblast is significant. In 1984 circulation using credit granted to industrial enterprises corresponded to the annual volume of sales of industrial products. The main object for credit was commodity and material values.

I shall give two of what in my opinion are the basic factors in the formation of supplies of prepared products.

Incorrect formation of the sales plan, which for a number of enterprises has not only not been increased by the amount of above-normative supplies of prepared products at the beginning of the year, but has even dropped lower than the planned volume of output of commercial products. There are 29 of these enterprises in the oblast's heavy industry. They do not have the right to credit for above-normative supplies of prepared products. Many heavy industry enterprises are doing a poor job of restructuring their production for the output of consumer goods of the proper quality and assortment. As a result, as of 1 January 1985 an overall sum of about 13 million rubles' worth of consumer goods had accumulated in the warehouses for prepared products.

These included engraved items, souvenirs, poor quality crystal, clocks for motor vehicles, electrical musical attachments, furniture accessories, tape recorders and so forth.

Production supplies for which credit has not been granted originate, basically, through the failure to fulfill plans for production and the product list, a lack of balance of these plans, or their unfeasibility. In 1984 the production plans of the Elektroagregat Production Association were changed 32 times, and the plan for the Sibelektroterm Association for the products list throughout the course of the year exceeded the plan for commodity output by more than 8 million rubles, which is equal to the production program for 2 months. And material values are shipped in for the initially formulated plan for the products list. For the Elektroagregat Industrial Association the initial plan for the products list for 1980 exceeded the plan for commodity output by 9 million rubles, and the Siblitmash Plant—4 million rubles. One must say that all these enterprises participated in the large-scale experiment and even that did not rid them of their unrealistic plans.

V. G. Iunin, deputy manager of the Kirov Division of the Gosbank, Novosibirsk: Inspections at large machine-building enterprises of the rayon showed that the main reason for the formation of above-normative supplies of commodity and material values is the lack of coordination in planning.

In the first place, because at a number of enterprises the volume of commodity output does not correspond to the sum of items, that is, the products list in units multiplied by the prices. In the second place, the accumulation of above-normative supplies is influenced by the products list since materials are shipped in for a specific machine. As practice shows, there are four variants of the plan in effect at the plants now. The first is the preliminary plan or order. It is drawn up by the enterprise itself in February-May for the next year. On the basis of this plan the supply services submit orders for materials. The second is the approved plan. This plan is submitted to the enterprise in November-December by the higher organization for the next year. On the basis of this adjustments are made in the deliveries of materials for individual positions. The third is the effective plan, which is approved taking into account the changes made in the verification period. The fourth is the production schedule. This is a plan-assignment for the shops to manufacture all machines. The supply services are obligated to provide materials for this plan as well.

Naturally, the difference between these plans leads to a growth of above-normative supplies or to interruptions in the supply of materials. If according to the preliminary plan they had planned a larger volume of machines than was in the approved plan, many materials go into residuals. The same situation exists when the effective plan is reduced (the difference between the approved and the effective plans) by so-called adjustment. There is also a difference between the effective plan and the production schedule. In the schedule they had planned more machines than in the state plan. Basically the schedule is distinguished from the plan by the number of machines which are to be produced in subsequent years, that is, a stockpile is created for the future.

The inspection in the Tyazhstankogidropress Association in 1984 showed the following quantitative divergence in the plans (in the direction of reduction): the difference between the preliminary and the approved plans--27 machines; between the approved and the effective plans--2; the underfulfillment of the plans for the products list--15; the difference between the effective plan and the production schedule--13; the stockpile for 1985 not indicated in the plans but envisioned by the production schedule--23 machines. A deviation of 80 machines is quite essential.

Our task was to clarify the sum by which the above-normative supplies of commodity and material values increased because of these factors. This is a difficult task. The simplest method is direct accounting. The supply divisions of the enterprise give a detailed accounting of the sum of the various machines that are not produced because of deviations from the plan. But this is not always possible. In practice, one uses the method of calculating from the percentage of completion, for which it is necessary to take into account the proportion of supply materials, batching materials and cooperation in the estimate of expenditures on production. Frequently the cost of parts according to the notification of shortages on the day of the inspection is subtracted from the expenditures according to the plan. In the association because of these factors the above-normative supplies increased by 2,944,000 rubles. On individual dates the increase reached 9 million rubles.

The next stage is to single out from this sum the incomplete production. In the association for an individual order they calculate expenditures for several machines and even for several models of machines.

When the accounting for incomplete production was switched over to computers it became clear that the plan includes one machine, but parts are counted for seven machines. Production makes the parts in a larger quantity than is required for the fulfillment of the annual plan. The workers of the association explain this by unification and the need to increase the batches of parts and allow the workers to earn their money.

These are the kinds of "games" that are played with the plan with the enterprise and outside of it.

G. Ye. Kolonda: So much negotiating has been done about the plans, but it is necessary to raise this issue again and again until the situation is rectified. After all, many enterprises, for example, received the plan for the 11th Five-Year Plan on August 1983. If planning is done this way there will be no precise order and, consequently, no rhythmic delivery, and there can be no simply normal work on the part of either the enterprise or the material and technical supply agencies.

N. B. Matveyev: Why does such a large quantity of above-normative raw and processed materials accumulate at sewing enterprises? Let us consider the concrete situation. We handle millions of meters of fabrics, thread and accessories. We received supplies in the form of paperwork and we do not know which colors the fabrics will be. Naturally, the fabrics, thread and accessories must be supplemented to achieve the right quality and color ahead of time, but nobody takes care of this and we have been given no rights to do

this. We receive about 100 different colors of fabrics. There are very small quantities of some of them and if you are short two spools of thread you have to take a whole package. Tekstilshveytorg does not delve into these problems, and neither does the Main Administration, although apparently these are its problems.

The planning agencies do not take into account the real capabilities of the enterprises. The plans that reach us are not ones which we are capable of fulfilling, and resources are not provided for us. Here is another one of the reasons for above-normative residuals, which require immediate sale, either through the UMTS or through other agencies. And the prohibition of sales without funds which was discussed above ties our hands....

Sh. B. Sverdlik, Doctor of Economic Sciences, Novosibirsk Institute of the National Economy: During past years in industry there have been few contradictory tendencies in the changes in the return for material resources. On the one hand, the return from material expenditures on commercial products has been increasing and the level of material-intensiveness has decreased from 65.2 percent in 1975 to 63.4 percent in 1980 and 62.3 percent in 1984. On the other hand, there is a decline in the return from material supplies and their turnover is slowing up. In 1975 for one ruble of industrial output there were 15.8 kopecks' worth of material circulating capital, in 1980--17.7 kopecks, and in 1984--19.8 kopecks. The reduction of this ratio by even one kopeck is tantamount to increasing the volume of industrial output by 1.7 percent.

The slowing up of the circulation of material supplies to a certain degree devalues the return on the resources saved directly in production. During the first 3 years of the current five-year plan the savings on raw materials, processed materials, fuel, energy, and other objects of labor amounted to 10.6 billion rubles, and circulating capital and supplies of commodity and material values in industry increased by 31 billion rubles. Not all is well in other branches of the national economy either. Material circulating capital per 1 ruble of national income used for consumption and accumulation increased from 69 kopecks in 1980 to 79 kopecks in 1984. There was a significant increase in above-normative supplies of materials, batching items and prepared products in the warehouses of the plants and organizations.

In 1984 material circulating capital in industry increased by 7 percent and payments out of profit into the budget and the bank for increased supplies amounted to approximately 600 million rubles, which is tantamount to reducing the production cost of products by only 0.1 percent. With this ratio the "weight categories" of the task of accelerating the turnover of circulating capital remains practically outside the field of vision of economic managers, and additional payments into the budget and expenditures on paying bank interest and penalties and suppliers cannot neutralize the advantage of having above-normative supplies.

I daresay that economic managers were really interested in accelerating turnover they would try to get rid of above-normative and surplus supplies of commodity and material values.

So far the supplies are not affecting their pocketbook and they--the supplies, that is, and not the pocketbook--are "destined" to inevitable growth. The fuller the warehouse the less the concerns the managers have with fulfillment of the plan with respect to the volume of production and the products list for deliveries. Ostap Bender asserted that he has 400 relatively honest ways of shaking loose or taking away others' money. An experienced supply worker has in his arsenal thousands of relatively honest ways of obtaining from state supplies more material values than he actually needs. It is possible to increase the expenditure norms, especially for newly assimilated products, and the average weighted group and experimental statistical norms. It is possible to reduce the residuals of materials and batching items in the warehouse and in complete construction as of the beginning of the planning year and, conversely, to increase the carryover residuals at the end of the year.... From the data of bookkeeping and statistical reports one can establish the growth of above-normative residuals, which is what planning, financial-bank, statistical and supply-sales agencies do. Therefore little effect has been produced by bank sanctions against enterprises that have accumulated above-normative supply; they miss the mark. The suppliers promptly dispatch the ordered material resources and the bank transfers the consumer over to a credit form of account and refuses to grant him credit to pay the accounts with the suppliers. The victim of these sanctions is not the guilty enterprise, but its suppliers who, as a rule, are not able to change the recipient of the material resources they have dispatched, especially batching items, and give them to other consumers at their own discretion.

The national economy has accumulated a large amount of positive experience in monetary control over the balance of planning assignments. I think that it is necessary to plan the need for resources not only in physical, but also in value units of measurement. The cost of resources that are to be delivered to the enterprise from external sources (limit on deliveries) should be equal to the sum of material expenditures on production and the actual (expected) residual of production supplies as of the beginning of the planning period minus the normative of internal circulating capital and special-purpose supplies for which the bank has extended credit, until the end of the period.

The limit on deliveries should be established in the five-year and annual plans simultaneously with the approval of the production program and assignments regarding the level of production costs and material expenditures per 1 ruble of commodity output. Within the range of the established limit on deliveries the enterprises can, at their own discretion, conclude agreements with suppliers, and the bank institutions should without obstacles pay the accounts accepted by the enterprises for the products they have ordered.

G. I. Loginov: Why, in my opinion, is there an accumulation (or freezing) of material values? There are several reasons.

First, this is the result of the lack of correspondence between the needs of production for material resources and the funds that are allotted for them. It is no secret that the main factor determining the quantity of allotted materials is not the production need calculated on the basis of normatives and volumes, but the so-called "base," that is, the quantity of the given kind of material allotted and received by the enterprise in the past year. For

example, the enterprise's real need for any kind of material in the next three years is 100, 80 and 120 tons, that is, 300 tons for the entire period. But the supplies are never allotted this way. Most likely they will be (and this is after tortuous substantiations) 100, 80 and 90 tons (no more), that is, for the third year they will make up for the shortage of 30 tons, but the "base" will not allow anything else. According to a different variant in which the base is sequentially increased by 8-10 percent per year which can be substantiated, we receive 100, 110 and 120 tons, that is, for the first and third years we receive what we need and it is not important that during this period we have received an extra 30 tons, and moreover everything is logical from the standpoint of the organization of material and technical supply, the "base" is not reduced, and prerequisites are created for obtaining material in the future.

In the second place, the plan for production and the plan for deliveries, as a rule, are not coordinated in terms of the calendar dates. These are two independent plans which exist independently of one another. One can give as many examples like this as one wishes, both from industry and some construction, including even startup projects. But since the production plan is a sacred thing, it must be fulfilled in any case without reservation, and there remains only one solution--the enterprise creates its own internal reserve of materials and with this it smoothes out the aforementioned disjunctures, and then again there are above-normative supplies. The worst thing is that the lack of confidence in obtaining materials at the required times has become universal and internal supplies are beginning to be created at all hierarchical levels: from the central material warehouse of the enterprise to the production section.

In the third place, the existing interrelations between enterprises and material and technical supply agencies do not envision responsibility of the latter for prompt and complete satisfaction of the orders of the enterprise. The enterprise is always to blame: when it has been allotted no supplies ("You are not able to work since you are unable to realize your supplies"), when it has been allotted all the material on the last day of the quarter and it is physically impossible to obtain it and take it away ("You were given everything, but you cannot even take it away"), and so forth. There is only one protection with such a system of interrelations--to create a supply so that the production will not be frenzied and subsequently all these problems can be solved in a more peaceful situation. To be sure, there is one other way of smoothing out the disturbances that arise in the system of material and technical supply: mutual exchange of resources and mutual assistance from one enterprise to another.

The provision of materials and batching items for scientific research and experimental design work is in an even more delicate situation. The system of orders at the beginning of the year and a year in advance forces them to be oriented only toward series-produced materials and items and leads to an increased demand for them because it is difficult to determine this demand. The scientific and technical level of the developments also suffers because of this. The need to order no less than a shipping batch leads to a situation where they sometimes must order 10-15 times more than they need.

Is it possible to find a way out of the situation that has been created? It is possible. The following desires are expressed regarding this:

To provide for allotting funds to the enterprises in keeping with their actual need, calculated on the basis of the normatives for the production plan, and to reject the very concept of a "base."

To provide for balance in the time periods for the production plans and the plans for the delivery of material resources.

To introduce strict material responsibility of the material and technical supply agencies for late and incomplete deliveries. The amount of the fund should be such that it will fully compensate for the damage caused to the enterprises by interruptions in the deliveries of materials. The same responsibility should be borne by the supply and prices to the material and technical supply agencies for failure to fulfill agreements for deliveries, and the fines for breaking the delivery agreements should be paid out of the material incentive fund, and if there is none--from the fund for social and cultural measures and housing construction.

To permit the enterprises to exchange material resources, but with an analysis of the reasons for the formation of surpluses of materials.

For material support for scientific research and experimental design work, to utilize more extensively store-salons and small wholesale stores, sending a sufficient quantity of material and batching items there, including those that have been newly assimilated in production, thus making it possible for developing enterprises to acquire them within the range of the estimate of expenditures under the article "Materials."

In considering the country's state of affairs regarding material and technical supply, one must take cognizance of the fact that it is a constituent part of the organization of production. Of course the role of the branch and its significance is great. But still this is only a constituent part of the organization of the production process, however important it may be.

As the discussion shows, the USSR Gossnab system has covered a significant path. Today it is a powerful organization with good capital availability. It has experience in rendering additional services to the enterprises and sorting materials. The role of the territorial main administrations of the Gossnab is increasing in the territorial organization of production. The reserves that still exist here, however, are much more significant than those that have already been realized. The main administrations are called upon to become centers that organize more efficient circulation of resources in the region both through their own complexes and through small wholesale stores and trade fairs. They probably can and should make up for the lack of a unified powerful territorial agency which has real resources and is capable of effectively engaging in the organization of continuous supply for enterprises and cooperation among them in solving certain problems of reproduction regardless of their branch structure. Having data concerning the availability of resources, the Main Administration should have the opportunity to dispose of them efficiently in the interests of the enterprises.

The role of efficient (and not burdensome to the country's economy on the economic plane) supply is increasing immeasurably because of the tasks set in the last decisions of the CPSU Central Committee. Scientific and technical progress places on the branches special requirements that have never been so critical before. These include expansion of the list of deliveries, rejection of strict funding conditions, the delivery of materials in small batches, mediation in cooperative deliveries, and so forth.

How prepared is the branch to carry out these tasks?

So far the degree of preparedness is not as high as is required by the conditions of the day. It is impossible to solve problems of material and technical supply with strict funding conditions while the economy is in operation. And adding bulkiness to the situation with extra supply levels only creates a larger number of documents and coordinations, confuses the supply system and impedes scientific and technical progress at the enterprise. It has become economically necessary to eliminate excess parallel supply organizations whose existence causes immense material harm to the country's national economy. The effect here will be obtained both through more effective operation within the framework of a large-scale complex that is equipped with modern technical equipment, including computer equipment, where a professional collective is concentrated, and through the introduction of scientifically substantiated norms for the expenditure of materials which today are frequently elevated in the branches as compared to the Gossnab norms. As a result there are immense supplies of deficit materials. According to investigations of specialists of Zapsibglavsnabsbyt, in 1984 the supply of materials in the region reached the 2-year norm with respect to several positions, including deficit materials. And there was not a single position for which there were minus figures for the resources. If 50 percent of the resources were concentrated in the hands of Zapsibglavsnab, the need for those in the shortest supply would decrease by 25 percent.

Of course there are branches of the national economy where it is necessary to have increased reliability of supply. But at the same time, it is inadmissible to maintain more than 100 parallel organizations for material and technical supply within three oblasts--Omsk, Tomsk and Novosibirsk--which is extravagant for the country's economy. Their elimination should contribute to more effective provision of resources for such branches as light industry.

The idea of creating a unified commodity bank for the country is very interesting. This will make it possible to sharply increase the mobility of resources and to reduce the shortage of them. The basic questions in the organization of material and technical supply in the country must be resolved at the state level.

The basic directions for restructuring the work of Gossnab agencies is changing their territorial administrations over to payment from the final result of the labor, whereby sufficient supply for the region's production program would be the only condition for increasing the material rewards for

their workers. It is probably necessary to reduce maximum responsibility of these agencies for the results of their work.

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IMPROVEMENTS SUGGESTED FOR SUPPLY SYSTEM

Novosibirsk EKONOMIKA I ORGANIZATSIIA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 5, May 86 pp 106-118

[Article by G. V. Grenbek, candidate of economic sciences, and Ye. A. Solomennikova, Institute of Economics and Organization of Industrial Production of the Siberian Branch of the Siberian Branch of the USSR Academy of Sciences (Novosibirsk): "Delivery Discipline and Forms of Supply"]

[Text] Two Faces of Supply

Shortcomings in material and technical supply, shortages of materials and batching items, interruptions in deliveries.... In the periodical press and data from questionnaires of managers of enterprises as well as in their statements at conferences and meetings, these phenomena are among the basic ones and are even the major difficulty in work and the basic reason for the lack of rhythm and interruptions in the fulfillment of planned assignments.¹

Positive strides in the work of enterprise and production associations that are operating under the conditions of the large-scale experiment have depended largely on priority supply and transportation service. Such is the opinion of the majority of managers of these enterprises and specialists who have observed the course of the experiment.

This question, which was the subject of discussion at our "round table," cannot be reduced to a criticism of shortcomings in the work of material and technical supply agencies and careless supplies. It is necessary to single out the objective organizational factors that give rise to these shortcomings in order to earmark a system of measures, separating them into solutions of an operational nature which should be taken immediately and solutions of a long-range nature which involve extended work. In this connection the following seems important to us. First, it is necessary to delimit to essentially different spheres of material and technical ties among enterprises: material and technical supply in the narrow sense and outside batching. In the second place, it is necessary to avoid a one-sided approach—only from the standpoint of the client—which is a fairly widespread feature of the statements regarding these questions, even though the position of the supplier deserves no less attention.

The ever-increasing role of material and technical supply and batching (and the ever-increasing difficulty of providing for their efficiency and reliability) are a predictable consequence of the level that has been reached in specialization and the expansion and complication of ties among economic objects which it causes. The sizes of intra-industrial material flows are colossal even today: more than 50,000 enterprises and production associations and more than 20 million kinds of products for industrial purposes, and the need for repeated realization of each pair of "supplier-client" ties throughout the course of the year over the immense expanses of the country. The diversity of material intake supporting production processes at individual enterprises is very great, especially at machine and instrument building enterprises. For example, the products list for manufacturing for producing the household radio from the Berdskiy Plant which is well-known in the country exceeds 11,000 positions, received from 300 suppliers in all parts of the country. The Izhmash Association receives 30,000 kinds of products and batching items from 1,500 suppliers and is itself, in turn, a supplier for more than 8,000 enterprises. The Kharkovskiy Elektromekhanicheskiy Zavod Production Association receives about 120,000 positions from more than 760 suppliers, delivering about 100,000 types of various electrical equipment. The Ashinskiy Metallurgical Plant delivers 16,000 types and brands of steel and alloys.

Batching--The Offspring of Scientific and Technical Progress

Scientific and technical progress is increasingly accelerating the development of specialization and therefore there is a complication and an increase in the number of intraindustrial ties. Additionally, in the material flows that circulate among industrial enterprises, batching is increasingly being singled out--both in terms of the proportion and in terms of its significance for the final results. Economic theory distinguishes such types of production ties among enterprises as material and technical supply (initially in the narrow sense of this concept) and cooperation.² As we know, material and technical supply includes deliveries of mass standard products, for example, raw materials, processed materials and fuel, and there is a presumed homogeneity of the commodity map in terms of its properties in each form, that is, these properties are not dependent on the place of their production and consumption. The selection of the supplier-consumer pair makes no difference from the standpoint of industrial consumption. The essential factors are transportation expenditures and the "reliability" of the contracting agent. "The subjects of cooperative ties are not raw materials, but semimanufactured products and batching items. As distinct from material and technical supply, in this case the products are manufactured according to the technical specifications of a given consumer and cannot be used by other ones, writes R. Ye. Leshchiner.

Special attention should be given to productions for which cooperative deliveries and batching have already become the main form of material and technical ties with other economic units. Batching acts as an especially important form not only with respect to the relative proportion of deliveries in the overall volume, but also in terms of its role in the creation of the given item and the degree of dependency on it that is shown in design and operational features and the properties of this item. As an example let us

give data for four machine-building enterprises of related profiles. They are ranked according to the proportion in the overall commodity output of items with complicated designs that are considered to be new technical equipment because of their technical characteristics.

A comparison of the indicators that have been presented demonstrates with a concrete example the processes that take place in the branches of machine building, namely:

the proportion of batching corresponds to the proportion of items of new technical equipment in the overall volume of production;

for enterprises that combine the production of the same kinds of items but of different generations (enterprises I, II, III), it is typical to have a wide range in the proportion of batching items in the production cost of individual items;

the increase in the proportion of this part of the production expenditures is accompanied by a rapid increase in the products list and a complication of deliveries;

only with an increase in the volumes of the production of items with a high level of batching (enterprise IV) are the cooperative ties concentrated in a relatively smaller number of supply enterprises, although the diversity of the latter in terms of the branches to which they belong does not decrease.

Table--Material-Technical Ties of Enterprises

Type of production	Enterprise	Enterprise	Enterprise	Enterprise
	I Small Series	II Series	III Series	IV Large series
Proportion of purchased semimanufactured products in production cost of commercial output	6.0	27.0	27.6	61.0
The same for individual items				
Maximum	38.2	80.0	86.3	74.0
Minimum	5.3	10.0	5.0	42.4
Number of product list positions in batching	1862	15,000	20,000	30,000
Number of supply enterprises for batching	275	350	510	68
Number of supply VPO's	85	11	—	21
Number of supply ministries	17	10	10	12

Batching presupposes direct stable ties between the supplier and the client also in all cases when it comes to special products manufactured according to the technical specifications of the client and the volume of their production is limited to a single order. Naturally, the transit form of deliveries continues to be the predominant one here, regardless of the size of the order. Improvement of this sphere of production ties between enterprises requires a

special approach which involves further development of structural forms of management of industry and the economic mechanism. The development of the warehouse form of supply (quantitative--in terms of the proportion in the overall circulation, and qualitative--mainly in the direction of the efficiency and reliability of deliveries) pertains to materials for general industrial purposes, that is, products of mass production.

Mass Production and Supply of Numerous Kinds of Products

One should note, however, that the technical and technological parameters of a number of items of machine and instrument building require specialized properties in the materials that are used for their production: special grades of steel, nonferrous metals, special alloys, special profiles of rolled metal, special plastics and paints in quantities that are determined by the volume of production of the given item. The enterprises that manufacture these items place on the raw material branches demands of the same nature as those for the delivery of semimanufactured products and batching items through cooperation. Similar requirements, although for other reasons, are increasingly being placed on suppliers of raw and processed materials by enterprises of light industry--footwear, sewing and haberdashery. The growing demands of the consumers for quality and diversity of items for personal use and the changing fashions--everything that leads to instability and diversity of the assortment--has an influence on the raw material branches through the chain of technological ties.

Finally, one more circumstance which makes it necessary to expand the assortment of products in the raw material branches, especially those such as the metallurgical industry--the need to reduce material intensiveness and the task of economizing on raw material resources. Material-saving technologies rely, among other things, on the application of special grades of metal and on precise selection of types, profiles and sizes of rolled metal. This is also confirmed by the discussion in the directors' club. The chief of Metallosnabsbyt, V. V. Voronin, introduced data to the effect that during 5 years at the Western Siberian metal base with a little-changing volume of deliveries of rolled metal (400,000 and 380,000 tons) the assortment in types, profiles and sizes increased almost three-fold--from 5,000 to 14,000 positions.

Thus along all of the basic aforementioned lines for the development of material and technical ties among enterprises, the more and more rapid increase in diversity and, as a result, the reduction of the amounts of the needs of the clients for individual kinds of manufacturing are objectively conditioned processes. For mass production which is based on large-unit capacities of aggregates (a typical feature of enterprises of the raw material branches) an increase in the diversity and the reduction of the sizes of the orders will inevitably lead to a reduction of the overall volume of output calculated in physical or conventional-physical indicators and to a deterioration of the utilization of the installed capacity. This is manifested especially clearly in such a traditional branch of heavy industry as ferrous metallurgy which has developed here as a branch with extremely large and giant enterprises with immense unit capacities of the main technological aggregates. Effective utilization of these capacities,

especially when there is a shortage of resources delivered by the branch, is a serious national economic problem. Yet the volume of production of rolled metal has not been increasing in recent years at the rates required by the national economy. One of the reasons may be that the utilization of rolling mills is not efficient enough, in spite of the measures taken by the branch to reduce the list of products produced by each large rolling mill on the basis of specialization of these mills. Thus the loading of the high-grade rolling machine 360 at the Kuznetsk Metallurgical Combine (according to data for one quarter) is characterized by the following figures: small orders (up to 5 tons) make up 20.6 percent of the overall number of orders, and their total volume in rubles of commodity output is 2.3 percent. Through means of production planning the rolled metal producers try to consolidate the batches and reduce the number of times that machines are adjusted to a minimum. But still the calculations for the three KMK mills (280, 360, 450) show that minimum losses (that is, taking into account only the diversity of profiles and sizes with the most favorable sequence of tolerances, maximum preparation of homogeneous small orders and carrying out the most labor-intensive adjustments during the course of planned preventive repairs) comprise from 1 percent to 7 percent. Understandably, the absolute amounts of these losses are the greater, the greater the capacity of the mill. Thus the minimum losses on the 280 mill are 105 physical and 160 conventional tons, on the 360 mill--1,270 and 1,910 tons, respectively, and on the 450 mill--8,100 and 17,000 tons, respectively. The actual losses of capacity associated with the increased assortment can be considerably greater if the royal metal is produced precisely according to ordered grades of steel. The supplier, trying to reduce the number of adjustments and to consolidate the batch in order to do this, gains permission from the clients to replace the grades with others that are close in their properties which, in particular, explains the agreement with the clients on the transit form with small orders.

The contradiction between the need for complete utilization of installed capacities and the need to expand the assortment is manifested not only in the metallurgical industry at the junctures with the metal-consuming enterprises. This is a general contradiction in the utilization of the advantages of mass production and diversification of industrial and private consumption. The main ways of overcoming or mitigating this contradiction in principle are well-known and confirmed by practice. In the industrial sphere itself these include part and component standardization and unification, the changeover to flexible automated production; in discrete productions, the rearrangement of the structure of production capacities in the direction of an expedient combination of large, small and medium-sized unit capacities and large, small and medium productions of units in raw material and other analogous branches. As we know, in the United States in Ferrous Metallurgy the so-called "miniplants" have been extensively developed. In 1990, according to predictions of American specialists, they will account for one-fourth of the production of rolled metal, and by 1995--one-third. We have also made a certain amount of progress in this direction during recent years--we have put into operation or are putting into operation three modern enterprises of the miniplant type. We also have previously constructed enterprises with an incomplete metallurgical cycle, but other important features of many plants are not inherent in these. In a certain sense the calibration plants which are parts of Soyuzmetizprom can be considered prototypes of these enterprises.

When they were created the goal was to provide an intermediate stage for the preparation of large-scale metallurgy products to be used directly by the industrial consumer. But actually their operation and further development are proceeding according to the departments to which they belong, and these plants inherently have a general tendency to be transformed into large enterprises with large aggregate capacities.

Barriers We Have Not Yet Managed To Overcome

The restructuring of the production sphere in the aforementioned directions is a costly and long-term task. Measures of an organizational measure can be carried out more rapidly and less expensively.

If one traces the history of the development of organizational forms of Soviet industry it becomes especially clear that the volume and forms of state regulation of material and technical supply and sales has proceeded from the specific peculiarities of the main units of the cost-accounting organization of industrial production and were related to those concrete forms which these units took during a given historical period. Relying on a particular form of basic cost-accounting units--trusts, syndicates, cost-accounting plants and factories, cost-accounting main administrations of the 1930's and, finally, production associations--state regulation of the processes of material and technical supply and sales, in turn, has significantly influenced the actual level of cost accounting independence of these units and the effectiveness of the economic mechanism which was to have regulated their interrelations.

State regulation and organization of material and technical supply of enterprises under its jurisdiction were carried out for a long period of time mainly by the corresponding departmental agencies. And the closer the department was to encompassing a pure branch or subbranch, the greatest degree to which the supply functions in these departments were directed toward providing for deliveries from enterprises of other departments (branches). Intradepartmental circulation involved a loss of the homogeneity and the single profile which was typical of the enterprises under their jurisdiction, that is, deviations from the branch principle of management.

The need to overcome departmental boundaries when organizing production interrelations throughout the economy led to the creation of interdepartmental agencies for state control of material and technical supply, and the volume of work of these agencies increased as the departments broke up (an increased number of people's committees and then ministries) and as the number of cost-accounting units increased and their specialization became deeper. An important landmark in the development of organizational forms of management of industry was the decree of the CPSU Central Committee and the USSR Council of Ministers of 2 March 1973, "On Several Measures for Further Improvement for Management of Industry." The decree envisions such forms of organizational and economic concentration of production as would simplify the task of organizing and centrally regulating intraindustrial material and technical ties as a result, in the first place, of reducing the number of cost-accounting units participating in economic circulation and, second, through changing over some of the material flows from external circulation among cost-accounting units to internal circulation of production associations.

We should like to especially emphasize the second point. The most important aspect of the decree is the need to create associations at the first and second level as unified production and economic organisms, that is, to reinforce within unified cost accounting administrative frameworks the existing stable cooperative ties among associations that are joined together. It was especially emphasized that production associations, all-union production associations and rayon production associations should be created regardless of the previous departmental jurisdiction of the objects included in the association--exclusively on the basis of production and economic expediency. But when developing and implementing the general plans the ministries proceeded precisely along the path of creating associations within the framework of previous departmental organizations: all-union production associations and rayon production associations--on the basis of the "abolished" main production administrations, and scientific production associations and production associations--from the enterprises under their jurisdiction. In a special investigation conducted by the Institute of Economics of the Ukrainian SSR Academy of Sciences it was shown that "only 18 percent of the production associations in machine building and 9 percent in light industry were formed according to the principle of stable cooperative ties."³

The results of this kind of implementation of the decree are understandable: in the oblast they have not managed to make any essential changes in material and technical supply, and the rayon production association in the all-union production association in reality have not become scientific production and production complexes, having remained as before intermediate administrative units. An example: in the RSFSR Ministry of Light Industry the enterprises of the leather industry are "associated" in Roskohzhprom, and the footwear industry--in Rosobuvprom. The two technological stages in the creation of footwear throughout the European part of the republic are separated administratively and by local cost-accounting interests which are contradictory in terms of the evaluation indicators that are applied. Only in the eastern regions (east of the Urals) were there not enough enterprises of the same kind located close together in order to create footwear or leather associations on their basis did they create leather-footwear associations (combines) which were raised to the next level in Roskohzobuvprom. Let us add to this example the other components that are necessary for a pair of leather shoes (lasts, accessories, gluing materials and dyes, threads) and it turns out that this item which is not too complicated by modern standards is manufactured through joint efforts by at least five different departments under the direct leadership and control of state administrative agencies.

Another example. Two years ago we specially analyzed the ties for cooperative deliveries among enterprises included in one middle unit of management, and here are the results we received: cooperation among these enterprises comprises no more than 7 percent of the overall volume of cooperative deliveries, cooperative deliveries with other enterprises of the same ministry comprise 13 percent, and cooperative deliveries with enterprises of other ministries account for 80 percent. And, of course, in keeping with the existing policy at least 80 percent of the current production and technical ties of these enterprises are regulated at the level of the USSR Gosplan.

Thus it is necessary to further improve the structure of management of industry and develop the so-called comprehensive production associations which include production units of various profiles on the basis of close technological ties among them.

Restore the Warehouses! The warehouse form of supply has always been regarded as a decisive means of relieving suppliers of small orders and relieving transportation of inefficient shipments. Normative documents which regulate the selection of forms of deliveries limit the transit form by the transit norm and the norm of the order. This is written in the textbooks. But in the same textbooks (for example, in the textbook by N. D. Fasolyak⁴) it says that the predominant form of material and technical supply is the transit form, which accounts for 75 percent of the overall volume of deliveries. The warehouse form accounts for only one-fourth. The figures in and of themselves would not cause alarm if it were possible to assume that all these three-fourths of the annual turnover of material and technical supply consist of large orders. But the facts show something else. Data have already been given above concerning the loading of rolling mills with small orders. Here are a couple of more examples. Of the 5,000 recipients of products from the Rizhskiyelektromashinostroitelnyy Zavod Production Association, 200 have sizes of orders that are equal to or exceed the minimum dispatch norms;

The Kharkovskiy Elektromekhanicheskiy Zavod Production Association dispatches 35 percent of the volume of the products it produces in small batches; the Magnitogorsk Calibration Plant fills more than four-fifths of all of its orders in amounts below the carload norm, and small orders (up to 5 tons) comprise almost half; at the Kamensk-Uralsk Plant orders less than the transit norm comprise 20 percent, and orders less than 2 tons--more than 10 percent of the overall number of orders. It would be possible to continue this list.

The question automatically arises: under these conditions, is it realistic to expect that the enterprises will be able consistently (from month to month) and scrupulously (for all positions on the products list and all orders) to fulfill their commitments for deliveries;

And if they can, at what price?

At 10 enterprises of the USSR Ministry of Ferrous Metallurgy as an experiment production divisions were combined with sales divisions. The goal could be understood: to make the work of production workers subject to the schedule for dispatch and to make 100-percent fulfillment of contractual commitments a task for the entire collective. This idea is being realized most consistently at the Ashinskiy Metallurgical Plant. As V. Kuzmishchev reports, the shop receives from the combined production and sales division not an assignment for the output of rolled metal, but a firm schedule for dispatching products to specific consumers. The shift foreman receives a schedule along with a package of schedule orders. He must provide for the output of all the necessary grade-type-sizes of metal, combine them into batches to be shipped by rail and send them to a specific client, reporting not on tons of metal produced, but on carloads of equipment.⁵ Following the logic of this restructuring of operational control of production, one could also take the

next step--let the foreman distribute the package of the schedule-orders among the brigades of rolling mill operators, let the brigades make up the carloads in the same way and be responsible not for tons, but for the dispatch of carloads. Or is this not really possible?

Of course any idea can be taken to the absurd, which we have done in this case. But after all, the seed of this absurdity was planted not by us and not on paper, but by real life. In fact, to make 100-percent fulfillment of contractual commitments a task for the entire collective and to subject the work of production subdivisions to the dispatch schedule are two completely different formulations of the goal; the former is correct and the latter is incorrect and, in the final analysis, harmful.

Everyone should make his own contribution to carrying out the former task in his work position. A worker--through high labor return and unwavering display of labor and technological discipline; the foreman, shift chief and shop chief--mainly through the fulfillment of production assignments and concern for the best utilization of the resources allotted for this; the planning and distribution services of the enterprise--through the development of optimal plans that combine more complete utilization of production capacities with the filling of the portfolio of orders, and efficient accounting and control over the fulfillment of these plans; the ministries; the Gosnab and the Gosplan--to the creation of normal working conditions for the enterprises, particularly conditions which will not allow the undermining of production capacities for the fulfillment of small orders.

There is an obvious and apparently extremely simple means of achieving this latter point--to make the norm of the order the same kind of immutable law as delivery discipline is. These norms should probably be revised and brought into line with the conditions of the present and the future. The norms for orders should rely on a broad network of territorial supply bases that are well-equipped with modern equipment for warehousing and loading and unloading work, automated information systems and scientific methods of monitoring supplies. Without an essential change in the development of the warehouse form of supplies it will not be necessary to sacrifice something in the future as well: either the utilization of the established capacities or the demands of the clients for an expanded assortment of raw materials, processed materials, standards and, thus, possibilities of introducing material-saving design and technological decisions or deficit resources which are frozen in inefficient supplies with each supplier and each consumer. Only with a developed network of territorial supply bases will it be possible to link the norms for orders to the most significant parameter--the structure and specific features of production capacities in industry.

Typically, the market for ferrous and nonferrous metals and a whole number of other materials for general industrial purposes in capitalist countries proceeds along the path of increasing the amounts of direct orders to producers. A. F. and A. S. Myrtsymov in their interesting work⁶ present figures from foreign periodicals that characterize this process. Thus American specialists assert that metallurgical enterprises will soon stop taking any orders less than 500 tons, and in Australia by 1978 the minimum order for a metallurgical plant for rolled metal of the usual quality is 1,000

tons and for certain kinds of it--15,000 tons. The prohibition of small direct orders is achieved by the establishment of large increments to the prices which motivate the consumer to resort to the services of distribution centers and service centers that act as intermediaries between the producer and consumer in providing for small one-time orders and deliveries of small batches which make it unnecessary to create their own supplies.

We must also refer to our own positive experience. In Leningrad on the territory of the Production Association imeni Ya. M. Sverdlov they have created and are successfully operating (under dual jurisdiction--to the Gossnab and the USSR Ministry of the Machine Tool and Tool Building Industry) a branch sorting base. At first it performs only functions of putting together batches of design steels in the required sizes and grades for operations orders from 14 machine tool-building plants of the Leningrad group. The base "carried out unification of the demands for all these orders, as a result of which the list of the kinds of rolled metal that were consumed was reduced considerably.... It now satisfies more than 75 percent of the needs of the plants for high-grade design rolled metal. The shortage which previously reached up to 50 percent of the kinds of products ordered, now does not exceed 10-12 percent and only for 10-15 positions."⁷ The work experience of the base of the Western Siberian Administration for Metal Supply and Sales, which was reported by a participant in today's meeting, V. V. Voronin, is instructed. The base's main activity today is sorting and filling out orders from other territorial bases of Siberia and also enterprises of Novosibirsk and adjacent oblasts. As distinct from the aforementioned assorting base of the machine tool builders of the Leningrad group, the Western Siberian base is not limited to the departmental framework of one industrial ministry and its circulation (in tons of metal products) is 20 times greater, the technical supply is incomparably higher, and the assortment is much wider. And here is another distinction: the Western Siberian Territorial Administration acts as a large client--a contracting agent for ferrous metallurgy, a sorting base for Leningrad machine tool builders, and a client of the Leningrad Territorial Base for Metal Supply and Sales. Which form should be given preference? Probably a correct and efficient combination of various forms, depending on concrete local conditions.

In conclusion, a couple of words about one more aspect of the development of the warehouse form of supply. Here, in the sphere of circulation and service for industrial consumption broad prospects are opened up in the development of production services--giving materials different properties, measured cutting and other production operations which provide the client with materials with a higher level of production readiness. The creation in territorial agencies of a supply system for production services not only promises a great economic effect, but is already producing one in appreciable amounts--in places where this work is conducted with initiative. This question, it seems to us, deserves to be made the subject of a special discussion.

FOOTNOTES

1. See, for example, materials from the discussion of the "Directors' Club" printed in EKO No 12, 1984.

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3. "Razvitiye proizvodstvennykh obyedineniy v promyshlennosti" [The Development of Production Associations in Industry], ed. N. G. Chumachenko, Vol 1, Kiev, "Naukova Dumka", 1983, p 131.
4. "Ekonomika, organizatsiya i planirovaniye materialno-tehnicheskogo snabzheniya i sbyta" [Economics, Organization and Planning of Material and Technical Supply and Sales], ed. by Fasolyak, N. D., Moscow, "Ekonomika", 1980, p 229.
5. See Kuzmishchev, V., "Ashinskaya Steel," PRAVDA, 8 May 1984.
6. Myrtsymov, A. F., Myrtsymova, A. S., "Obsluzhivayushchiye tsentry v sisteme metallosnabzheniya" [Service Centers in the System of Metal Supply], Kiev, "Naukova Dumka", 1981.
7. Kulagin, G., "How To Expand the 'Bottleneck,'" PRAVDA, 25 July 1984.

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RESPONSE TO ARTICLE ON TIMBER COMPLEX

Novosibirsk EKONOMIKA I ORGANIZATSIIA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 5, May 86 pp 118-121

[Response by N. Ya. Bakalov (Village of Malinovskiy in Tyumen Oblast) to the article by I. N. Voyevoda and L. N. Petrov, "The Effectiveness of the Timber Complex," EKO, No 3, 1985]

[Text] The article titled "The Effectiveness of the Timber Complex" hits the nail right on the head. As a person who has worked in the timber branch for more than 30 years, I can confirm the correctness of all of its points. The only thing I cannot understand is why the opinion of scientists and their research is not taken into account when developing the program for the development of the country's timber complex.

I should like to discuss the following aspects. First of all, the situation with respect to technical supply for the complex is quite unsatisfactory. Plants for producing fiberboard and chipboard can operate only on high-quality equipment. If we produce some of this in our country (individual units) it is not without shortcomings. A country so important for timber as ours should not put up with such a situation. The planned capacity of a number of plants is 20,000 cubic meters a year, but up to this point not a single one of them has reached this.

We sometimes purchase spare parts for the basic equipment from other countries. There is excellent equipment abroad, for example, in Finland and the FRG (the Bizon firms). Now throughout the country high-quality equipment is augmented with that which is manufactured in a semiprimitive way. There are dozens and even hundreds of people bustling around these tiny plants, but there is little point in this for the quality of the products is low, the production cost is high, and the products are produced at a loss. New measures are necessary for organizing the production of high-quality equipment.

Another example. In our country today there are several plants in operation to produce buildings made of fiberboard. According to the idea this should be advantageous. The slabs are made of industrial chips and other wastes from processing timber. But I know of a plant where for the cornices of the building and the wall panels they use 22 cubic meters of timber material,

since the quality of the chipboard is poor. Moreover, it emits toxic formaldehyde in excess of all the normatives. What are 22 cubic meters of timber materials? This means 45 cubic meters of round timber from which it is possible to build an excellent, durable wooden building which is hygienic in all respects. And the chipboard could be used for the floor, the attic and the dividing walls. Moreover, it takes 1,000 men a year to make 1,000 buildings out of chipboard, not counting the labor expenditures on the production of chipboard itself. And the labor-intensiveness of the manufacture of a building made of round timber under plant conditions is several times less. I deliberately used the word "to build" which also has the meaning "to cut logs." Now in Tyumen Oblast and in other oblasts of the country machine tools have been "independently" manufactured for calibrating round logs and other operations. Elements or modules of excellent buildings are made under plant conditions. This was apparently not taken into account when plants for manufacturing chipboard buildings were purchased.

If this wasted money had been used for the development of machine tool building, which would have provided us with machine tools and equipment, the effect would have been apparent.

And one more consideration. In the timber industry we have the indicator "Commercial Timber." This indicator which has been included in all the reports and summaries and has performed its historic mission should be resolutely revised. And the sooner the better. We have always seen as a goal in itself only pure, natural, God-given timber. And we have had it without too much trouble, felling forests in Europe and in Asia, and not especially concerning ourselves with a view to the future. But now we have arrived. We now have two paths: either follow the old one more and more slowly or select the path of intensive development of the timber complex. This means that we must consider commercial timber to be all parts of the tree--from the roots to the cones. And all planning should be done only from this point of view, envisioning the processing of the sawdust, bark, branches, scraps and also that which we now call commercial timber. Of course this will require a significant quantity of machine equipment. It should be produced centrally and on a large scale. This will be possible if we form a single branch under the aegis of the USSR Ministry of the Timber, Pulp and Paper Industry. Only under this condition will it be possible to carry out a unified technical policy in all "timber" affairs.

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FURTHER DISCUSSION OF TIMBER ARTICLE

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 5, May 86 pp 121-122

[Article by S. Rozhdestvenskiy (Orekhovo-Zuyev, Moscow Oblast): "The Plan Must Not Be a Goal in Itself"]

[Text] I agree with the authors of the article when they say that increasing the effectiveness of the timber complex involves improving the management and organization of production. But there is some doubt about the possibility of mechanically transferring the positive experience of the Prikarpates Association to other regions. Judging from recent articles in EKO, the success of this association is conditioned largely by the personal qualities of its top manager and the peculiarities of the collective he has created. But if this experience is mechanically transferred, joining together forestry, timber procurements, and processing of timber, the results could turn out to be negative. In Yaroslav Oblast, for example, all kinds of work in the forests are done by the timber combines of the Ministry of the Timber Industry, but this does not lead to the same results as in the Carpathian area. The same thing is true in Moscow Oblast.

At one time the timber industry in the central areas of the USSR engaged mainly in the allotment of felling areas, the restoration of the forest and the supervision of timber procurements. Moreover, according to the recollections of people who have lived in the area for a long time, there was more order in the forests than there is now when all elements of the timber complex are concentrated in the hands of a single agency. In fact, this frequently leads to a prevalence of the interests of exploiting the forests over the interests of their reproduction. For people are held strictly accountable for the plan for procurements, but forestry measures are frequently looked upon perfunctorily.

It seems to me that the functions of the person in charge of the timber supply should not be turned over to agencies responsible for obtaining timber products. On the contrary, these functions should be separated from those of all economic subdivisions. Then the latter will be able to be combined into comprehensive timber enterprises, including, in addition to the functions listed in the article, also hunting. Correspondingly, both the Main Hunting Administration and the Ministry of the Timber Industry can be combined with

the Ministry of the Timber, Pulp and Paper and Wood Processing Industry. At the same time, the functions of the agency in control of the timber supply should be assigned to the Main Administration for Preservation of Forests, which would have the opportunity to dispose of the material and monetary resources allotted for forestry, and protection of the forests from fire and pests.

Under these conditions the local rayon subdivisions for forestry protection could ask as agencies to monitor the utilization of forests and in the event of violation of the conditions for the utilization of timber (for example, negligence of felled areas, destruction of undergrowth) the timber supply for the timber procurement workers could be cut off until the violations were corrected. These same forest protection agencies would act as a client for all kinds of forestry work and measures for protecting the forests from fires and pests. In the event of unsatisfactory performance of this work they would not receive payment and would not be counted in the plan of comprehensive enterprises. In the event of damage to the forest by fires, insects or elks (which have recently caused more harm than fires) the forest protection agencies would charge the losses to these enterprises.

In conclusion I shall recall a story told to me by an old and honored forester. During the times of the Main Administration for the Protection of Forests (1940's and beginning of the 1950's) one of the government leaders said: "You are working poorly: nobody is complaining about you." And yet during those times the timber was just as necessary as it is now. But the concern for protecting the forests, in my opinion, was greater.

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RESPONSE TO ARTICLE ON PRIVATE AUTOMOBILE

Novosibirsk EKONOMIKA I ORGANIZATSIIA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 5, May 86 pp 123-128

[Response by O. D. Markov, candidate of technical sciences, Kiev Highway Institute, to the selection entitled "The Private Automobile--Not a Private Affair," EKO, No 5, 1985]

[Text] While supporting the criticism of the automotive service system contained in the articles on problems of passenger vehicles, I wish to make some suggestions for improving it. The existence of several automotive service systems, primarily firm and, as it were, general purpose (these include the Soyuzavtotekhobsluzhivaniye VPO of the Ministry of the Automotive Industry and the republic automotive service in organizations included in it) is extremely inconvenient for the consumers. In our country firm systems are not economically justified.

In the first place, even the most developed system of firm service--the VAZ system--satisfies no more than 40-45 percent of the demand for service, while the others satisfy even less. In the second place, the economic interrelations between the manufacturing plant and its firm system are such that the plant is not economically motivated to fully satisfy the demand for services. In the third place, with the modern level of private automobile transportation and that planned for the near future, the network of firm stations over the immense territory of our country cannot be dense enough. Therefore the existence of various separate systems leads to an increase in the distances between automotive service stations (STO's) and creates inconveniences for the car owners. Yet world experience shows that even with a well-developed network of service stations (with a distance of 30-40 kilometers between them), for the convenience of the clients the firms organize service of automobiles at stations of other firms.

In addition to the shortcomings noted in the selection of articles, the departmental separation of automotive service has a negative effect on the possibilities of specialization of STO's and their provision with spare parts and materials. Moreover, each department tries to have the largest number of spare parts, advantageous kinds of services and the best personnel. Under these conditions there can be no discussion of efficient distribution of STO's, the specialization or the optimization of their capacities either with respect to structure or with respect to the volume of services.

Thus in the Ukraine automotive services are authored by enterprises of the Ukrainian Republic Specialized Administration (URSU) Avtotekhobsluzhivaniye, firm systems of the Volga, Moscow and Zaporozhye plants, and also small enterprises of the UkrSSR Ministry of Consumer Services, the Automobile Lovers Society, and DOSAAF. The VAZ system services 44 percent of the Zhigulis, and 56 percent of the Zhigulis are covered by enterprises of Avtotekhobsluzhivaniye.

What does this lead to?

The firm network of STO's in such cities of the republic of Mirgorod, Berdichev and many others is small and there are no "general purpose" STO's, so the owners of Volgas, Moskviches and Zaporozhetzes are forced to go to other cities: the VAZ stations that exist here will not provide service for them. At the same time in certain cities the STO's are "densely" located--both VAZ and those of Avtotekhobsluzhivaniye. Under these 11th Five-Year Plan there was no intention of reducing this lack of uniformity: of the 33 VAZ STO's it was planned to construct 30 in those cities which already have "general purpose" automotive service enterprises.

In the republic there are no individual systems for providing spare parts for enterprises of the URSU Avtotekhobsluzhivaniye or the firm network. This lack of coordination of material and technical supply and control of spare parts precludes the possibility of determining the optimal demand for spare parts and leads to the formation of large above-normative supplies and the doubling of transportation expenditures. With departmental separation there are greater expenditures on maintaining the administrative staff. Thus in Kiev there are four automotive service associations of various departments and two computer centers valued at more than 1 million rubles each, although in Kiev Oblast it is sufficient to have one association, and in the republic--one computer center. Moreover, control over the production and economic activity of the firm STO's on the part of the head plants is weak because of their territorial distance. It has been calculated that if a unified system for automotive service were created in the Ukraine this would produce a savings of no less than 20 million rubles a year.

The Ministry of the Automotive Industry, which has jurisdiction over the majority of automotive service enterprises, is neither technologically nor economically motivated to provide leadership of this system and certainly not to reflect the interests of the owners of private automobiles.

It is also necessary to improve the system of planning: we must plan not for the production of spare parts, but for their consumption. To do this it is apparently necessary to have direct ties between the automotive service system and the supply plants.

Even now prerequisites are being created for realizing this system. The fact is that the indicator of the normative net output has been applied at automotive service enterprises since 1974, that is, five years before it was legal to apply it in other branches. The output of the STO does not take into account the value of the spare parts and materials. Because of this the

station is interested in using a minimum of spare parts. The car owner is interested in the same thing. Thus the objective indicator of the need for spare parts is the demand. Hence the most important task: to plan the activity of the automotive service enterprises on the basis of the demand. To do this it is necessary to study and predict it.

The planning of the activity of automotive service enterprises on the basis of the demand does not require any special changes in the organization of planning. It can be done as follows: one determines the structure of the demand per one automobile, for example, in rubles; the norm of the consumption of services per one automobile is multiplied by the number of automobiles in the region (taking into account the fact that not all automobiles utilize the services of the STO, this product can be multiplied again by a certain reducing coefficient). Thus one determines the first approximation of the volume of demand for the various kinds of services. On the other hand, one determines the handling capacity of the STO in the region; a comparison of the demand and the handling capacity of the STO makes it possible to reveal the possible level of satisfaction of the demand and plan in a substantiated way the development of the automotive service capacities.

The following conclusions obtain from what has been said. Just as it is not necessary to plan the output of footwear individually for the left and right feet, so it is not necessary to plan individually the production of automobiles, on the one hand, and their technical service and repair, on the other. If one plans the output of automobiles then correspondingly it is necessary to plan complete satisfaction of the demand for technical service and repair. Under these conditions the enterprises can be permitted to establish for themselves independently the volumes for the majority of indicators, with the exception of the satisfaction of demand (following the example of consumer service enterprises for which, under the conditions of the experiment, profit is set as the main indicator).

For automotive service enterprises it is necessary to develop a system of indicators, economic incentives and forms of payment for labor that provide motivation to satisfy the demand completely. Now the main indicator for them is the volume of sales of services, which forces the STO's by any means, frequently to the detriment of the quality of services and the interests of the automobile owners, to maximize the volume of services in rubles. With this indicator the labor-intensive and costly services are advantageous to the STO's and the minor services which the car owners need most frequently are disadvantageous.

Attempts are being made to change the situation through, for example, introducing subscriber service, assigning motor vehicles to the STO's, and introducing the indicator of "number of cars serviced" or the indicator of "profit." Not all of these suggestions are unquestionable. In our opinion, for automotive service enterprises it is necessary to establish this basic indicator: the level of satisfaction of the demand for regional automotive service (of the production association, republic administration, VPO) and the number of rejections--for the STO. This indicator orients the STO's toward the satisfaction of the demand for services. Understandably, this will require changes in the system of accounting and in a certain way also the

economic mechanism; it should be comprehensively thought out and scientifically substantiated. But if we wish to achieve the desired results in the area of automotive service, this indicator can serve us well.

In our opinion, changes are also necessary in the system of payment for the labor of workers at automotive service enterprises. Now workers employed in technical service and repair of automobiles receive wages and percentages of the ruble of services, and wage rates are established for engineering and technical personnel (most frequently lower than the earnings of the worker).

The economic experiment presupposes including engineering and technical personnel in the brigades. In our opinion, the payment of workers per ruble of services should be differentiated; for volume, quality and promptness, and engineering personnel, so that they will be motivated, will receive wages in percentages of the overall earnings of the brigade or all workers of the production section in which the engineering and technical worker works (foreman, technologist, operator, cashier). Improvement of the work of technical service stations and complete satisfaction of the demand are impossible without technical reequipment. The development was envisioned to take place by adapting premises in constructing small technical service stations. But this path did not turn out to be effective enough in practice. When adapted premises are allotted, as a rule, difficulties arise, and the five-post STO's that are coming to be used in technical service stations have a long time period for recouping expenditures and they are arising in small quantities.

A principally new economic approach is required in order for the automotive service capacities to develop more rapidly than the fleet of private automobiles does. Production and operation are by nature inseparable. Therefore it is necessary to have an economic interconnection between the production of automobiles and their technical servicing and repair. It would be expedient to deduct a certain percentage from the cost of each automobile that is sold for the development of a network of technical service stations.

The modern economic mechanism for the development of automotive transportation for private use requires an unlimited increase in the output of spare parts, the need for which will practically never be satisfied because of the extremely long service period of the motor vehicle. This is explained by the fact that the cost of the automobile is considerably greater than the costs of the spare parts for it. The solution to this problem consists in coordinating the production of automobiles with the output of spare parts for them. Here it is also necessary to have economic levers, one of which, in our opinion, can be the redistribution of the price of the motor vehicles and spare parts in the direction of increasing the latter while leaving the overall expenditures on the acquisition and operation of the automobile unchanged.

Practice shows that there is an actual shortage of several dozens kinds of spare parts. All the rest of the shortage is conventional. Thus in the automotive service system in the Ukraine there are large supplies which are concentrated in the warehouses of the STO's in the form of above-normative supplies and nonliquid assets. The mechanism for the operation of the existing system of material and technical supply is as follows: the central

base tries to immediately turn spare parts over to the interoblast bases, and they turn them over to technical service stations. Reverse flows of spare parts are not envisioned, so that the STO's accumulate spare parts and above-normative supplies are formed there. If one were to eliminate the limitations on the level of supplies at the central republic base and the interoblast supply bases there would be a possibility of organizing the republic's material and technical supply system in a more efficient way: at the central base there would be an unchanging supply of all of the spare parts and materials (100 percent), at the interoblast bases--a certain level of the products list (presumably 50-60 percent) and at the STO's--a limited supply of the spare parts that are used most. In the use of the computer center it is possible just by changing the organization of control of the system of material and technical supply to practically eliminate above-normative supplies, to considerably increase the effectiveness of the utilization of the entire list of spare parts and materials, and to eliminate the conventional shortage.

One of the essential problems of automotive service in general has escaped the attention of the departments and organizations involved in the production, service and repair of motor vehicles. This is the amount of time clients spend on searching for and acquiring services. But this "article of expenditures" is extremely essential. The most approximate calculations show that every automotive service worker removes from the sphere of production throughout the course of the year at least one other worker (if this idea is continued, it turns out that because of automotive service a plant such as the VAZ does not operate for an entire year). Such a state of affairs, if evaluated from the national economic standpoint, brings to the fore the problem of minimizing the amount of time spent on searching for and obtaining technical service and repair of automobiles. In our opinion, this will be possible by solving the problems touched upon in this article.

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RESPONSES TO AUTOMOTIVE SERVICE ARTICLE SURVEYED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 5, May 86 pp 128-135

[Responses reviewed by T. R. Boldyrev: "Difficult Meters of Automotive Kilometers"]

[Text] Many readers who responded to the articles on problems of the private automobiles reproached the magazine for the fact that the subject turned out to be too narrow. "The automobile is not only a purchase; it involves the entire system of living relations between the owner and his family. The passenger vehicle is an external covering of an entire system of social relations and must necessarily be regarded from this standpoint," writes Yu. V. Yegorov (Leningrad). He is seconded by Yu. G. Pavlishchev (Moscow): "These are issues not only on the personal plane of individual (millions!) of car owners. This is a problem of combining economic, social and ecological categories." In the opinion of the authors of a number of the letters, the most important thing is to determine "where we are to go," that is, the paths for the development of motoring in our country.

"Unfortunately, the most crucial issue was not touched upon: is there any point in further developing passenger automobile construction from the state standpoint? Would it not be better to create a network of motor vehicles for hire with centralized repair and storage?" (Ye. Ye. Kogan, Brezhnev). This idea is supported by P. M. Savelyev (Shatsk, Tula Oblast): "I think that it is necessary to develop public transportation and also services for renting passenger cars and especially microbuses."

Let us note that even 15 years ago in an article entitled "The Automobile and Us," which surveyed the prospects of passenger automobile construction in the country, corresponding member of the USSR Academy of Sciences D. P. Velikanov wrote: "There is no doubt that rental is very useful and necessary. At one time rental points began to develop very rapidly here, but then they died out just as rapidly. A valuable idea was compromised because the forms of its realization were not thought out well enough."¹ Yet car rental is developing successfully in many countries, even those that are saturated with motor vehicles. It is necessary for those who do not use automobiles regularly but on occasion. And, as the selection of articles shows, they are in the majority. Let us hear the opinion of a specialist in this. P. M. Katsevman

(Riga), while working in the Institute of the Ministry of Consumer Services of the Latvian SSR, on instructions from the republic Gosplan, participated in drawing up long-range plans for the development of automotive service. He thinks that "when solving the problem of vehicles for private use a mistake was made which must be corrected immediately. The majority (about 90 percent) of passenger vehicle owners use them for vacation and in their free time only during the summer period, and only 10 percent use them year-round. Is this not too wasteful? Therefore it is necessary to have rental of passenger vehicles, which will free the owners of concern for repair and storage." The idea of rentals is recalled by a reader from Ivov, V. Ye. Alferov: "How can we utilize the passenger care more efficiently? We know the way--rental. To be sure, people may object: we have already tried this and have said experience from the past. But at that time the cars for rent were basically old (in terms of both age and design). There was no state service network. The organization of the rental itself was not the best. Now everything has changed. If reasonable prices are established for rentals and it is organized efficiently, it will be economically effective for the society as well. Of course there is a lot to think about. The vehicles received for rental should always be in good repair. The locations of the rental points, the times for checking them out and turning them in, the delivery and release of the vehicles--in a word, everything that provides convenience for the clients--should be carefully thought out and improved in the process of the development of this sphere of services."

Apparently now, when a qualitatively new situation has developed, we should return to the idea of rentals and discuss it thoroughly, taking into account all the pluses and minuses and all the "trivia" which frequently defeat good undertakings, and then give the "green light" to the rental of passenger vehicles.

Problems of automotive service turned out to be the most pressing for the readers. And this is not difficult to understand. We shall not repeat the stories from car owners about those ordeals they experienced in repairing motor vehicles because they only add certain strokes to a well-known picture. The general opinion of car owners concerning the work of automotive service stations is expressed well by the reader S. M. Pitukhov (Berezovskiy, Sverdlovsk Oblast): "At some point conclusions are needed. The EKO articles only recall the machinations and abuses in the automotive centers. These centers could do a great deal even with the existing spare parts, but I have never found a health atmosphere there. Automobile owners generally say that it is "terrifying" to go there. They get on your nerves and will not even do what they could do without any difficulties" (he means the automobile owners). It is curious that this word "terrifying" which is not altogether usual in a situation when speaking actually about a quite peaceful variety of consumer service is used by other readers as well. What are the automobile owners so afraid of in these respected institutions? In their opinion the poor work of the automotive centers has gone beyond the level of simple squabbling: "There is a blemish on social life. Among the native factors that undermine social justice, immediately after bribe comes the absurd handling of the automobile" (A. Ya. Potemkin, Odessa). The readers are demanding that the fight against abuses at technical service stations be conducted not in words, but in deeds.

"I have owned an automobile for 22 years," writes L. K. Ivov from Sverdlovsk. "During this time I have seen everything. But in recent years the automobile has become not a means of transportation but a heavy yoke hanging around your neck. It is necessary to wage the most resolute struggle against speculators. If one can find that a private trade has any part, and the salesmen themselves sell parts on the side, it should not be difficult for the police to find these salesmen and their 'sources' which supply them." Indeed, "the easy times for the producers of passenger cars have passed and now it is necessary to have a serious restructuring, accounting for the demand and all-around development of service" (A. V. Yefin, Moscow). The solution, in the opinion of those who responded to the selection, is "a unified system of production, sales and service for passenger vehicles. This is the only way it is possible to solve the problems raised under this heading" (V. N. Zhirov, Lvov). Concrete measures are also suggested for improving service: improving the outfitting and supply of automotive centers with instruments; not violating technological discipline (the cry from the soul--"To remove all sledgehammers and chisels from the work positions!"); and improving quality control in the organization of production. In the opinion of M. M. Pogozhev (Barnaul), it is necessary to create conditions so as to assist the owners of older cars in getting rid of them: "To create a centralized system for turning in outdated cars for a certain amount of money as is done with radios and television sets.

The readers supported the idea expressed in the articles of selection that the strain experience with service stations could be eased if the automobile owners would begin to repair their vehicles themselves or conditions were to be created for this.

In our society we conduct a course for labor training of the younger generation. We teach the children to do everything with their hands. I was taught this by my parents, for which I am very grateful. All this came in very handy when I had a Pobeda. I did everything myself. When I became the owner of a Zhiguli I could not do the repair myself--there were no spare parts (I could not even change the oil). I am afraid to go to the station. And so I go around to the speculators. But then I gain the real satisfaction of having repaired my own care. I sit at the wheel and I feel the reliability of the components that I have looked at myself. So I think that if 50 percent of the money which is allotted for the construction of service stations were to go for spare parts, in some places 40 percent of the car owners would begin to repair their own cars. Next to us are 15 garages and I can see the satisfaction with which people tinker with their cars" (A. I. Medyantsev, Sverdlovsk). This idea is supported by L. K. Ivov. "I suggest leaving the complicated repair work up to the service stations: body work, the engine and so forth. If they have the spare parts 90 percent of the automobile owners can do the rest of it themselves. The sale of spare parts can be organized through mail order. The gas stations can sell oil and filters."

Let us note that now in many schools children are taught to work with automobiles. It would seem that if boys and even girls everywhere were able to drive and repair a motor vehicle, this would help in solving many of the automotive problems. In order for this to happen it is also necessary to expand the spectrum of models of passenger cars and to create the most varied designs which are intended for all occurrences in life, which are

reliable, "easy to repair," not capricious, and economical. Unfortunately our automotive construction on the whole is proceeding along the path and creating models of the middle class. There are quite a few models, but the majority of them have approximately the same properties that are important to the consumers such as sizes, weight, expenditure of fuel and displacement. So far there is only one example of departure from this average--the preparation for the creation at VAZ of a motor vehicle of an especially small class, the Oka. We hope that it will appear on our streets without delay and that it will justify the expectations of the automobile lovers who are interested in it.

The reliability of the automobiles is the reverse size of the service problems. Unfortunately, many readers note that the new automobiles are not becoming more reliable or trouble-free in operation. M. P. Fleytman from Kirov, when comparing the VAZ models, notes the deterioration of quality: "In 1972 I acquired a VAZ 2101, which I drove for 10 years. The vehicle did not need any repair work. In 1982 the VAZ 21013 came along. These models were not very different in design, but there was another difference: in price--a great difference, and in the quality of operation--a significant difference. Thus I discovered defects in the vehicle I obtained (here follows a list of many of them--Ed.). With the third repair job the engineer responsible for the warranty promised personally to check and he said that, in addition to everything else, in two of the valves the covers had been turned by 180 degrees when they were installed. But also the work for eliminating the defects was done at a low technical level, without technical guidance or supervision. And not one of the trips to the service state took care of the problems.

The readers also discussed with interest the problems of prices of motor vehicles and gasoline. The majority supported the idea of creating an inexpensive automobile. Let us recall at least the historical fact that in the aforementioned article by D. P. Velikanov he said (and this, we repeat, was 1971): "The plant in Tolyatti, whose planned capacity is 650,000 automobiles a year, is beginning to put out a fairly large number of them. And it is inevitable that after a certain amount of time the release prices for the Zhigulis will begin to gradually decline, and without harm to the profitability of the production itself." Thirteen years after the appearance of this article only the prices of the Niva have dropped. We understand that the price means more than just production outlays, but we still think that the automobile could be less expensive.

I curious means of easing the "social tension" thought about by the fact that it is impossible for a considerable part of the population to purchase an automobile was suggested by T. V. Savina from Shebekino. "The society should be interested in making sure that families with many children find it easier to cope with their family obligations, so that their children will grow up more spiritually developed. While these families cannot own passenger cars. In order to help the state could introduce special benefits for purchasing them, for example, it could give a 10 percent rebate from the price for each child. and families which have given birth to the 11th child could be given a passenger car or, better, a microbus free of charge."

As concerns the crisis of gasoline, the readers have decided that the buyer could not become accustomed to the new prices. This has sharply increased the amount of theft and caused a great deal of moral harm to the society. Thus in the report of the USSR Procurator General at the third session of the USSR Supreme Soviet it says that in Gorkiy animalists alone he labored so long as a result of measures for preventing theft, the sale of gasoline by gas stations to passenger car owners increase threefold during a year.² According to calculations of specialists in Lithuania, for example, for every 100 kilometers of travel the car owner uses only 4 liters of gasoline, although he asks for about 10 liters. And many owners of Volgas and Zhigulis do not need the expensive AI-93 gasoline; they can do quite nicely with A-76, which is used for cargo transportation. This fantastic savings means that the Lithuanian state budget is actually failing receive 60 million rubles in income, and throughout the country this figure amounts to more than 2 billion rubles.³

The readers are asking when someone will put a stop to this and how they intend to do it. They are interested in why we have not begun by introducing such a simple measure as covering the gasoline that is poured into the tanks of cargo automotive transportation. The readers also recall the need to interpret the experiment conducted in the Baltic area where the drivers are given money instead of coupons for gasoline. A. A. Prokopyev notes also that limiting the expenditure of gasoline by state automotive transportation, which was done in order to reduce thefts, reduced the matter to the absurd: for departmental passenger automotive transportation they established a limit of 170 liters per month, which amounts to about 8 liters per day and can be used up in 2-3 hours of operation. And with vehicles that are offered to the enterprises on loan the limit is 98 kilometers a day, which is equal to this same 2.4 hours of work.

For the sake of fairness one must say that certain readers suggested allowing gasoline to remain expensive (in order to ease the situation of those who use their automobiles rarely and to "put the squeeze on" ("kabys"). But this is only if there is an inexpensive automobile. It would seem that here it is necessary to take a closer look at the experience of other socialist countries.

And so the letters that have been included in the survey and also those that have been left out clearly show the "unsinkability" of automobile, "service," "gasoline" and other problems involved with the private passenger automobile. In spite of the numerous articles in the press they stubbornly resist resolution. Is this not what has caused the pessimism of the readers with respect to the future? "I think that the private automobile is in general unnecessary under the conditions of our country" (A. L. Novokhatskiy, Severo donetsk). Apparently the lack of desire of the leaders of the Ministry of the Automotive Industry, VAZ and many other departments to respond to the justified demand of the automobile owners have nullified in the eyes of present and future purchasers the advantages of moving "on their own wheels."

"The magazine has noted a number of pressing and painful problems which should have been solved already. A number of them have been suffered through by millions of car owners. The question arises: What will change after this

article? After all, all this has been written about more than once, and even writers are mere mortals. People with authority have responded to them in an authoritative way. But what will come of this? As a result, we have in 1985 what you have shown us so clearly.

"My father is a mechanic and my mother has worked as a driver. I have smelled the gasoline since childhood and I love cars very much. But when a neighbor asked me which make to buy I advised them not to get into this business at all. A car will give you more trouble than it is worth," writes A. I. Medyantsev.

Indeed, the state of affairs, for example, in the AvtoVAZtekhobsluzhivaniye Association and the recently created AvtoVAZzapchast firm is not improving, in spite of the change in management and the numerous declarations made to leaders of the AvtoVAZ Association and the branch. The plan for 9 months of 1985 was not fulfilled and there were considerable arrears in the repair and restoration of parts, the supply of spare parts, and the construction of new automotive service enterprises. Apparently the large production association has turned out to be incapable of handling the functions of consumer services.

So what next--"Do not tie yourself down," do not purchase a car? We think that as long as not all potential car buyers have come to such conclusions there is still time to take measures to improve their quality. The "Comprehensive Program for the Development of Consumer Goods and the Sphere of Services During 1986-2000" envisions expansion of the network of service stations and satisfaction of the demands for automotive service and spare parts. But unless order is brought into the repair and technical servicing of passenger automobiles, even with the availability of capacities and spare parts, the difficulties of the automobile owners will not decrease. The readers also want to know the opinion of interested departments. "And not reports about what has decreased or increased and by how many percentage points, but essential information, precisely in the cross-section that was defined in the articles of the selection" (A. M. Dmitriyev, Leningrad).

We are sending the selection entitled "The Private Automobile--Not a Private Affair" and the responses to it to the Ministry of the Automotive Industry. We hope to receive answers that will satisfy our readers.

FOOTNOTES

1. LITERATURNAYA GAZETA, 10 March 1971.
2. PRAVDA, 4 July 1985.
3. PRAVDA, 27 June 1985.

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POOR PREPARATIONS FOR EXPERIMENTS DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 5, May 86 pp 137-149

[Article by Valeriy Lavrov: "The Mysteries of One Experiment"]

[Text] Many important experiments in the area of management are now being conducted in the country. They are providing for important observations and on the whole positive results. Yet sometimes the experiments are conducted one-sidedly, with the proper preparation and accounting for local conditions, and therefore they do not and cannot produce the expected effect. Sometimes one gets the impression that certain managers transform experiments into a goal in themselves. Yet the experimental verification of new ideas is one of the means for increasing the effectiveness of management, and a crucial task in this stage is the changeover from local research to an integrated system of management.

Examples of improper preparations for changing over to the experimental conditions for operation have served as material for the survey offered to our readers below.

This city is steadily growing toward a population of one million and they have even begun to construct buildings 5 kilometers away from the current city center, thinking that this way the city will reach its future boundaries more rapidly. It is known not only for its indomitable desire to catch up with and surpass other large cities, but also for its rapid reaction to all initiatives. And when the people here learned that in Leningrad, beginning on 1 July 1983, an experiment was being conducted for improving the organization and payment for engineering labor, they immediately decided not to let the Leningrad workers leave them behind.

This is what they wrote about it in the city newspaper:

"To verify and practice the new elements and principles of management, and to determine the most effective ways of increasing the return and prestige from professions that are essential to scientific and technical progress--such are

the tasks set for participants in the experiment for improving wages. All of these changes exert influence first and foremost on the personalities of the workers themselves. The new requirements and control force everyone to evaluate his contribution to the overall cause strictly and in adherence to principles and to think about what it means to be an engineer...."

This sounded eloquent and made one want to become acquainted with the innovators.

When I arrived in the city I first went to the machine-building plant. Its designers in a remarkable short period of time had put powerful swamp vehicles into production--wheelless machines on which the geologists and then the drilling workers went out into the polar tundra. These machines originated in the gloomy building of the plant design and technological institute. Incidentally, firms that are developing Alaska and the Canadian North are interested in them.

The head designer sat at his desk, which was covered with papers and files. For the joint work he was also considered to be the head specialist responsible for the experiment:

"Yes, yes," he said. "We are working in the new way. These are all the papers from the experiment. If you are not allergic to complaints about a shortage of time, I will tell you that there is not enough time for the main thing: to introduce the best designs into the world of machines. The plant has designers, excuse my immodesty, of a world class, but, unfortunately, they are not the leaders of production."

"Are you not being too gloomy about this, Vasiliy Sergeyevich? Your swamp vehicles are widely known. Imagine what would have happened if we had gone into the polar tundra with just ordinary machines? And your cover aircraft is capable of transporting hundreds of tons without any roads and without any damage to the tundra...."

"Yes, yes," the head designer responded indifferently. "We have worked. Excuse me, I have to make a call."

He started to dial the telephone. Minutes passed. I could not restrain myself.

"Why don't you install those new Perm telephones instead of these primitive ones? They have a set of buttons, they retain 13 numbers in their memory, and if you add an answering machine to this you do not even need a secretary."

He looked at me as if I had come from the moon.

"You are recommending that we install a couple more of those automated work positions for designers and then all the rest of the people without whom our designers are lost now can be eliminated. They say that the designers have a low return and the women from the design bureau knit caps, sweaters and mittens while they are at work. This is not good. But how can we ask more of them if they receive less pay than do the women who clean up the shavings in the shops? Each person is worth as much as he is paid!"

"And how much do they pay you?" I asked.

"One-tenth less than they pay the leader of the brigade that assembles our swamp vehicles. When I was young I was stupid and I got bored with undressing at the beginning of the shift and dressing again at the end of the shift, of washing the oil from my hands--and I left the machine tool for the VUZ. If I were a little younger I would go back to the brigade."

"But the experiment is supposed to eliminate this injustice," I stated edifyingly, unable to find any other reply.

Vasiliy Sergeyevich laughed.

"Here is a simple calculation for you, at the level of school arithmetic: I took all the people on whom the destiny of a new item depends and divided by their number the savings on wages which we can dispose of at our own discretion. And perhaps it turns out to be 3.147 kopecks, calculating down to three places after the decimal point. You can check it."

He handed me three pages.

"Let us limit ourselves to participants in the experiment," I suggested. "This includes all the designers and technologists, right?"

"You are mistaken," said Vasiliy Sergeyevich. Shop designers and technologists, people who run the computers, suppliers from engineering services, copiers, and draftsmen were not included in the experiment. It is thought that one-third of the engineers are participating in the experiment, but actually it is every 10th one. And this proportion is even less if we go further, down to the testing stands, the assembly sites, the adjustment shops and the shops for assembling the prepare product."

"It turns out that you have taken hold of a head that contains technical ideas but nobody is interested in what happens with with other parts of the body. Is this not so?"

"Let me clarify that there are two heads: one is for technical progress and the other is for coming up with the products at the end of the month, quarter, year or five-year plan, regardless of anything else! It makes no difference to this second head what kind of products they are: if the plan includes stone hatchets and they are easier to make than iron ones, it is precisely stone hatchets that this other head puts on the conveyor. As head designer I do not have any real power in the shops. We are creating a wonderful machine, but they can distort it in the shops, because first they are lacking one thing, then another thing, and then something else. They use the engine which the engine builders have available and they apply a different grade of metal. And you know that it is acceptable to blame all changes on the "crudeness" of the design documentation. Nobody wants to see the obvious fact: the designers are forced to make numerous changes and to handle an ever growing pile of paper in addition to the mandatory documentation because the production is not capable of and does not desire to accommodate itself to the designers. And if

we manage to bring some item up to the world level it is only when only one head is in command!

"Why then did you take on the experiment if, in your opinion, it cannot radically change the existing situation?"

"I shall say frankly that we were glad about the possibility of paying intelligent workers more. We were told that there would be no limit to the increase in wages and therefore we agreed willingly."

"What do you mean, no limit? After all, every engineer has a limit to his capacities and forces?"

"Well, according to the conditions of the experiment, we could increase the wages of a talented and hard-working engineer 2-3-fold."

"And you have such engineers?"

"You mean, worth an additional 3.147 kopecks?"

"In the corridor the designers were involved in a game of billiards. On the first floor I went through a door and entered a small internal square. There were benches and all of them were taken. It was 11 in the morning. I thought it was a little early for lunch.

Take Aim, Be Ready for a Change in Goals

This building enterprise which I visited was a strange mixture of shops constructed during the last century and new ones that were jutting upwards. The former looked like completed steamships, and the latter reminded one of modern snow-white liners.

"We have one building from the 17th century," the commercial director, Viktor Petrovich, told me not without pride. "It would be a pity to tear it down. It is always the same: we construct a new building and we think about getting rid of the old one, but by the time we move in we again cannot do this.... The experiment with the wages of engineers? For us they are not a problem. There are plenty of them. We do not have enough workers.

"But still in any experiment--economic, social, technical--there are goals. They are reached or they are not. What goals are you pursuing?"

"In the first place it is necessary to increase the prestige of engineering professors, second, while leaving the wage fund unchanged, to increase wages, third, to reduce the number of engineers and, fourth, to improve the quality of new developments and shorten their path to embodiment in 'iron.'"

"And what happened?"

"Well, the prestige is a vague concept. Nobody knows how to increase it. Wages are something more real and we grabbed onto this. But, you know, it is a dangerous thing to increase the earnings for the best engineers without any

guarantee that the fund will not be cut at the end of the experiment. It is also dangerous to reduce the number of engineers because all kinds of unforeseen jobs come up. Then it is necessary to transfer some of the workers and engineering and technical personnel to other enterprises and organizations for a couple of months since it is necessary to have a reserve of workers. Incidentally, the goals for the year were changed: At first they demanded that we have final results and higher effectiveness immediately. Although the experiment was intended for 2 years and it takes a minimum of 4 years to develop a rivership for hauling containers...."

"Incidentally, about containers. Viktor Petrovich, I have long been bothered by this fact. Along the transcontinental railroad there are frequently trains with transit Japanese containers. The first vary and each one can separate his cargo, and the containers are of various colors, but they are all absolutely the same size. But when they ship our containers belonging to state enterprises, they are all different, both in height and in width, although they are all the same color...."

"We have a lack of coordination here as well: river lighter transporters were put into series production, and fairly quickly. And there are not enough lighters so that while they are being loaded and unloaded they stand idle, and then it is necessary to go without them to another port where they are. The effect of using these ships declines sharply, and it is not our fault."

Viktor Petrovich looked at my dictaphone.

"I recommend," I said to him, "no papers, no troubles, just press this button and give the cassette to the transcription typist, and then place a terminal here and at any time you will receive everything that is written."

"We are not up with your electronic exercises, we cannot even put our bookkeeping on computers yet. It would be better for you to speak about the experiment with the deputy head designer."

There were no papers on the desk of the deputy, Vitaliy Ivanovich.

"We received one of the automated work positions delivered by our branch each year and transferred the entire experiment to the machine," he said. "I recently returned from Leningrad. There they told me to change one little detail on the screen of the terminal. You can turn it either forward or backward, everything is in the palm of your hand, and you do what you wish. Soon we will have these...."

"But still what are the goals of the experiment?"

"Goals?!" Vitaliy Ivanovich took a sheet of paper out of his desk. "Let me think now. What exactly the prestige of the engineering profession is--this is not for us to figure out. But everybody knows what a good ship is; everybody also knows what good work is. In our plant 100 percent of the products are at the level of the world standards, and what more can I say? Higher quality or maintaining the existing quality--all depend on the shop. The general designers should be in command! And the entire rhythm should be

set by the designers and the technologists. Plus the client. But now, on the contrary, I do the arranging. And regardless of how much you say about prestige, what will change? The relations between the participants in the production process and those who use the products will remain the same. You cannot achieve a return with money alone."

"But still the wages have increased, or have they not? After all, maintaining a wage fund and at the same time reducing the number of personnel, as was the case in Leningrad, makes it possible to pay more."

"Yes, of course, if one is to believe our newspaper, wages and the productivity of designers are increasing as a result of the fact that we have gotten rid of the loafers. But we, for example, had none. We had to get rid of people whom we did not wish to get rid of. Here is what bothers me. Engineering services in any enterprise make it possible to look 5-10 years into the future. Shall we take a look? In the head designers' service the average age now is 50 years and there is no influx of youth. Who will be working here 10 years from now?...."

"They say that at certain enterprises the process is the reverse--youth are rushing from the shops to the design bureaus. An influx of new forces is another goal of the experiment."

"Hmmm," Vitaliy Ivanovich took out another piece of paper. "It would not hurt to take off the rose-colored glasses. Under the conditions we suggested it would be disadvantageous to hire youth. And they are not coming, at least not to our enterprise. They are not interested in working the whole day on something that can be done in a half hour with automation. A gifted young designer will leave us if we make him do routine work for which he knows that there is already automated equipment. You understand that if we reach world standards that it is the result of having too many personnel. They must be reduced, but by other methods."

Vitaliy Ivanovich took a fat file out of his desk. "I stay at work until 9 in the evening, and this is the kind of file I take home with me after work. My son is growing up without any male influence and my wife might wonder whether there is a man in the house...."

If Your Work Is Not Successful, Try Doing It as an Experiment

After my conversations in the machine building and shipbuilding enterprises I decided to visit an electrical equipment. At its request a fairly serious experiment had been conducted there: how to beat the competitors on the world market. A perplexing situation arose: in terms of basic parameters, certain of its machines were the best in the world, but in the final stage (assembly, adjustment, startup) the competing firms rapidly collected points because the machines were better equipped with instruments and service devices, and also because of better colors, lubricants and other trivial factors to which no attention was paid here. The reports of the associated assembly workers of the plant that came from abroad, it turned out, were not read by anyone, even by the chief of the associated assembly shops.

The hall by the director's receiving room was covered with flags, diplomas and certificates, and mockups of the products had been placed there.

As they told me in the receiving room, the director had gone to the capital. The head engineer, Ivan Nikiforovich, as tall as a basketball player, was the right size for his office. Or vice versa.

"Four of the offices of my chief academicians could easily fit in here," I noted, shaking his hand. "And the easy chairs! Fit for a king! Incidentally, you really are the kings of electrical equipment!"

"Sometimes all the people needed for a conference cannot fit in here," Ivan Nikiforovich stated with satisfaction. "So what brought you to our sovereign state?"

"An experiment with engineers for transforming them into creators, dictators of technical progress, and bringing them out of a certain slump that they have been experiencing in recent years."

"What precisely are you interested in?"

"Well, first, such an external indicator as the reduction of the number of personnel."

"We have closed down two divisions and four laboratories, and we have gotten rid of a total of about 300 engineering and technical personnel, that is, 20 percent."

"Not bad. Your branch is known for its innovations. And do you know they tell the anecdote that one Japanese firm reduced the number of engineers to one-12th the previous number without harm to production or without changing the time periods for the assimilation of new technical equipment."

"Their methods are unacceptable to us!" said Ivan Nikiforovich weightily. "There they suck everything out of a person and throw it away. For us, the reduction took place with a great deal of labor. Although this was not completely a reduction, but rather a departure of people who have long wanted to leave...."

"But as a result you were able to appreciably increase the wages of those who remained, is this not right?"

"On an average not by very much. For individual workers the increase was up to 30 percent. I could not evaluate this experiment separately from many other experiments that have been conducted at the plant. They successfully augment one another, but the engineering experiment affected mostly designers. Therefore you should speak with our head designer. On the whole the engineering services have still not felt the influence of this experiment very strongly."

I did not find out anything from the head designer that I had not been able to read in the local newspaper.

In conclusion, he said:

"What we are doing is an ordinary job. I personally do not understand very well why everything that takes place in industry is now called an experiment...."

In order to clear my conscience I called on one more experimental enterprises, the instrument building plant, but the secretary said that everything was in a turmoil because a commission had arrived. Neither the director nor the head engineer nor the head designer nor their deputies could find time. "Well, what are they inspecting?" I asked. "Are all of them really busy?" "Nobody knows what they are inspecting, and therefore everyone must be prepared. Some kind of comprehensive investigation." "A complex is a complex," I said to her, and with a light heart I went to the Engine Construction Association, which had not begun the experiment yet.

"It is difficult for us to experiment," said the general director. "In the shipbuilding, electrical equipment or even the machine building plants there are no conveyors, they have large items for which the cycle for manufacture is somewhat longer than the period of the experiment. But I have two lines from which prepared items are taken each day. Every day! Who could we get rid of there? I have already looked into this--the first to go would be pensioners! Well, I found a couple of obvious loafers. But then I looked around and there was nobody else to let go. They were warned about a strict unscheduled certification. Five nervous ones could not stand it and left of their own accord. The recertification was conducted and five more were fired. That is all! We calculated and shed a few tears, but there was not enough money to increase wages and the prestige had even gotten worse because the rest of them began to think about it. They began to leave of their own accord. We do not need this. We need people on the conveyor because we cannot get rid of the conveyor yet. The old machines need new motors, and the new machines also need new motors. We have to get a move on."

"And your designers?"

"What about the designers? Everything is normal. What they draw we make. That is what designers are for...."

You Do Not Know What To Do? Put on a Businesslike Appearance

In the experimental design bureau of the engine construction plant the chief has neither a reception room nor a secretary. Around his desk stood a crowd of men smoking furiously. "A conference while standing?"--and I joined them.

The chief of the experimental design bureau, a slight man of about 50 years of age, sat at a desk and, as I understood it, was persuading them to go to the capital. It was decided that they needed to go as a brigade for it was a serious question--coordinating the design for a new engine. It was necessary to get 20 visas. They wanted to carry out this responsible matter in a week--an unprecedent amount of time.

"Who will be stuffed into the trains and airports?" said Nikolay Semenovich, when the most stubborn member of the brigade that had been formed, mentioning his sick wife, gave in, and the brigade left. "Our poor brother designers. There are many of them in the capital. They are happy as schoolchildren when they manage to obtain their next visa in one of the organizations that has nothing to do either with new technical equipment or with new technology.... So, you are interested in why we are not participating in the experiment? Well, look, I have the annual plan written out: subjects first, second, third...10th...20th.

Nikolay Semenovich spread a large sheet of paper on the table.

"Here in this column is the volume of work. Ten thousand rubles, 20 (50 and here--the number of workers). Under the experiment they would strictly establish for me the volume of work and the wage fund."

"And what would you gain?"

"I would not gain, I would lose. The enterprises which are in the experiment have a clear-cut list of items and a large cycle firm manufacturing them. But our enterprise, frequently even during the course of the year, receives all kinds of assignments and additional items. And who will give us the additional wage fund and the additional people?

The second problem is that in the stage of sketching the item it is not clear how much the work will cost. The cost is disclosed in subsequent stages. Perhaps it will be more expensive and perhaps it will be less so. You cannot determine this precisely. Under the experiment could I transfer money from one subject to another and on the whole obtain the volume of work planned by the special design bureau? I cannot--the rigid establishment of the volumes and the wages for the various themes would keep me from doing this.

"In the third place, we are interested in the effect of the design development. One group of designers is making a machine that was tried and tested long ago, putting it into production produces a certain effect and the designers receive a significant bonus, while another group is making a machine which is necessary but the effect from it is low and the bonus is small. Can I transfer the bonuses from one group to another? Under the conditions of the experiment I cannot. They would drag me into the commissions and accuse me of arbitrariness and all the other deadly sins.

"The system proposed by the experiment has no flexibility and deprives me of my right to maneuver. The slogan is 'Reduce the Number of Personnel'--and that is all."

"Is this judgment not too severe?" I asked. "At the electrical equipment plant they think that with the experiment it is easier to improve the structure of technical services, it is easier to direct them toward new products and it is easier to provide incentives for the labor of engineers. Entire superfluous subdivisions disappear and executive and other kinds of discipline increase. The designers of electrical machines receive increments to their wages in amounts of up to 30 percent."

"In our experimental design bureau we have long used the piece-rate system of payment," said Nikolay Semenovich. "To be sure, in the stage of working design. But this also makes it possible to achieve all the same goals. Norm-setting of labor, personal wage increments, regulating the number of personnel --we have been doing all this for a long time, and without any experiments. And nobody can keep us from having this one structure or another within the limits of the standard distribution table."

"But the chiefs of the plant experimental design bureaus, the head designers and technologists have not had any real power or levers of material influence, and under the experiment they have been given this power and these levers," I would not give in.

"But is that all there really is to it? Take a look. The designer spends one-third of his time working in his own work position, one-third of the time he digs through the literature, sometimes without finding anything useful for production there, and one-third of the time he just walks around and talks. It is thought that because of this last third it is possible to reduce the number of personnel. It turns out that one-third of the wage fund is in our hands and we can do what we will with this money. With this kind of arithmetic I have complete freedom with the money and powerful financial levers in my hands...but this is in theory. And in practice, at 'experimental' enterprises the personal annual increments, it has turned out, can cover only 1 out of 10 people, some people get 3-month and monthly increments, but the majority of designers and technologists have been left without any increments, for the savings on the wage fund with all the manipulation of personnel, has not turned out to be very much. Far from one-third.

"We must start from this side and reduce not so much the workers as the pointless but, alas, inevitable work. Here an entire brigade of skilled designers has gone to the capital to arrange coordination. Quite a few more intelligent people in the experimental design bureau are working on production trivia: screws and bolts are being changed for others which can be produced by industry. And you know what an 'archive' is? A good deal of our efforts are also spent here. There frequently arises a need to compare a new development with all the preceding ones. This involves immense labor, since we do not have the technical equipment that makes it possible in a minimum amount of time to look through all the skeleton and fundamental systems of machines that are being produced or have been removed from production. And so designers dig around in the archives, not for hours, but for weeks in order to compare something once and for all. In our experimental design bureau one out of 10 people are working on new designs.

"But you do have a computer. Has it not facilitated your labor?"

"Of course, nobody can work without a computer today, but these are still simply rapid electronic calculators, and we need automated work positions with which it would be possible to obtain blueprints in a couple of minutes which follow all the rules and are suitable to be used. But so far the plans are receiving automated work positions like manna from heaven. The designers and

technologists have 'individual' instruments of all kinds for obtaining individual technical specifications. It takes a long time and hard work to unify the instruments. It is the same with computers. Everybody has them but few can work in dialogue and there is no range of peripheral devices. A computer without these is like a tractor without a plow, a cart and so forth. This is another reason why people have gone over to the experiment--they hoped that they would be given technical equipment without waiting their turn. But where are they to get it? And if they can get it, how much time will this take? In our special design bureau we have one telephone for 20 people, and it was invented in the last century! And this is also technical equipment without which the designer has to run to the various shops and divisions."

"But what should be done?"

"Unfortunately, even with the experiment little is changing in the chain of 'developer-manufacturer-client.' The developer as before adapts himself to production and client, to the product which the manufacturer has given him. But some unexpected things take place in the first link of this chain. For example, one of my designers with 15 years of service went into a brigade of assembly workers. I had raised his wages to the limit, but he left anyway. Have a talk with him."

I found him in an immense noisy shop. I looked at his clean uniform and his clean hands.

"Are you really in the brigade?"

"Yes, I am the deputy brigade leader for organizational problems."

"And what are your duties?"

"It has become difficult for the workers to work with today's blueprints. You see, there is all this idle time while the brigade leader tries to figure out what is what, and the brigade waits. You have heard: new systems--YeSKD, YeSTD and so forth and so on. There is more paperwork and the workers have to work, and not haul around blueprints. I did blueprints for 15 years, and when they suggested transferring me here I crawled out of the archives and the left the experimental design bureau. Nikolay Semenovich would not sign the application for two months, and then he quickly decided, saying: 'I will let you go under the reduction so that the others will learn how to work by themselves.'"

"And how much do they pay you in the brigade?"

"Twice as much as in the experimental design bureau, with all the increments, bonuses, and expense money. And the effect is obvious: whatever I say, this is what they do."

"And you are not sorry that you left?"

"What is there to be sorry about. For the first time I have felt like a human being. At home as well."

The secretary of the party gorkom for industry, Gennadiy Sergeyevich, looked at my dictaphone and said:

"That will not do.... And it would be better if you did not write anything about us. Or at least do not give our names or the city. I will say frankly that they were in too much of a hurry with the experiment. One could see how our designers and technologists differed: in the material and technical sense they were less well armed, there were fewer plants, but our heads are no worse than the ones in Leningrad. Both candidates of sciences and inventors. They included the experiment in the cityside program for scientific and technical progress. And here at the electrical equipment plant with the help of the ministry there are results, but in the rest of them it is necessary to figure out what is happening. Possibly all of the plants should have been placed in these conditions at the same time. Possibly the designers and technologists should not have been singled out. They told me at the enterprises: "Give us all of your engineering and technical personnel and your administrative personnel. But then we would still have been sitting in Moscow. At first they did not even want to listen to us and said that we should wait for the results from Leningrad."

"But it also possible to learn from failure. So say in your example...."

"It would be better to look at the VAZ, Dinamo, and Shchokino brigade experiments at those same enterprises," advised Gennadiy Sergeyevich.

In the area in front of the party gorkom fountains sparkled in the sun and women with baby carriages sat in the shade of the trees. Children in sandboxes were...experimenting with something.

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WAYS OF REDUCING LOSSES SUGGESTED

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[Article by S. N. Polevoy, candidate of economic sciences, O. F. Osnach, Odessa Institute of the National Economy, and A. P. Khromov, candidate of economic sciences, Odessa Scientific Production Association Kislorodmash: "Not Wastes, But Commercial Products."]

[Text] Bringing secondary material resources, specially scrap metal and wastes of ferrous and nonferrous metals, is very important for increasing the effectiveness of production. In Odessa a certain system has taken for revealing, sorting, redistributing and returning commercial metal wastes to production. The enterprises inform the Odessmetallosnabsbyt Administration about existing and possible residuals of substandard metal and metal wastes, the administration generalizes the information it receives and distributes it along the lines for its possible utilization. The corresponding information is sent to the union and republic ministers for establishment of assignments for enterprises under their jurisdiction in Odesskiy Rayon for utilizing wastes for internal needs, releasing them to Vtorchermet and selling them to outside consumers. Odessmetallosnabsbyt helps the enterprises to sell their free metal scraps. Thus during 1984 along with assistance from this administration the Stroygidravlika Production Administration and the Automotive Assembly Plant sold more than 150 tons of substandard metal scraps. In 1985 this volume increased considerably. For example, the machine building production association Orion sold 200 tons of scraps for the needs of agriculture and the Tsentravit Plant sold 400 tons for manufacturing consumer goods.

But the scale of the activity for salvaging commercial metal wastes and bringing them back into production in Odesskiy Rayon, in our opinion, is far from optimal. Of the more than 100,000 tons of scrap metal which annually appear there, no more than 3,000-3,500 tons are put to use in production, and the rest, unfortunately, as before go to Vtorchernet for subsequent remelting.

Let us say that we divide cheap metal into two different parts. One part we send into production and the other part we call waste. The corresponding expenditures of resources are divided equally between the two parts. Having

declared material waste (we emphasize not only metal, but also any other material), we immediately legalize the right to apply half of the labor expenditures, energy, value of funds and implements of production, transportation expenditures and also the cost of the metal itself that has gone to waste. The latter is relatively small as compared to the total cost of the previously listed resources. And regardless of how much effort is spent on returning wastes to production, with the existing system of calculations the maximum savings from this activity cannot cover the cost of standard full-value metal. Expenditures of other resources are simply not taken into account the present rules.

"Once something is a waste this means that it is worth nothing"--this traditional psychology was formed during the period of bright illusions that our country was provided with inexpensive resources for many centuries to come. Herein lies one of the major reasons for the situation which has been created today whereby high-quality metal falls out of the sphere of production. Moreover, writing off all expenditures of resources on the production of the commercial item increases its cost which is not the same as the consumer cost. And this means that because of an inefficient attitude toward resources the consumer of the product pays, the one who "purchases" those same resources which have gone to waste.

In our example both parts of the divided material have an equal right to be called suitable or to be called wastes. In fact, let us think about the content of the term "waste." Waste from what? From what is suitable? Suitable for what? For transforming its quality expressed by consumer qualities in the process of consumption. In other words, that which is called a waste under certain conditions can become a production resource. For example, wood shavings (a waste that has always been thrown away), having become a means of production, can be transformed into chipboard, and metal shavings--into blanks or prepared items. Why are shavings called waste while a much smaller particle of metal--finally dispersed powder--is valued as a high-quality commodity? And, conversely, a new high-precision costly item manufactured from the "usefully utilized" part of the metal under certain conditions can be removed from the process of consumption since it has repeatedly not been put to work. Such a situation cannot be ruled out if a stockpile of parts has accumulated in the warehouse of the enterprise and the design of the item has changed or it has been removed for production. Frequently new parts lay in the basis as a dead weight, artificially increasing the volume of unsold products and unneeded spare parts. And in the technological process stampings of threaded washers, plates for transformer cores, cold settings of bolts, fasteners and nails are generally not considered to be wastes in the ordinary sense of this term.

The task consists in providing for maximum utilization of all parts of the sheet of metal or any other material during cutting. There are no wastes! There are commercial products with various consumer qualities and various volumes of resources extended on their creation and products with various production costs and prices.

Continuing the discussion we come to this conclusion. The properties of commercial products which have been called "wastes" (we shall call them

"commercial wastes," thus emphasizing our point of view: any waste is a commercial product) can to a greater or lesser degree approach those properties which are required from a given piece of material when it is utilized in an item. The means that a commercial waste transfers from one sphere of production into another the cost not only of the material, but also the other resources (labor, energy, means of production, transportation expenditures and so forth). Consequently, the producer of the commercial waste participates through his resources in the process of producing products for the consumer. Therefore the latter is obligated to pay the producer the full value of the production of the commercial waste, and not merely the cost of the material (metal) itself, and also with the current markdown for being "substandard." The price of the product which is full should correspond to the expenditures on its creation.

The profit from the sale of the final product that is manufactured from commercial wastes is formed as a result of the difference between its price and the actual expenditures of the producer on processing the commercial wastes and their transformation into the prepared item. The price at which the final product is sold (the price of the commercial products) is used as the primary amount. It is established by a list of wholesale prices that is approved by the USSR State Committee for Prices. The price of the commercial waste is determined on the basis of the price of the commercial product for whose manufacture the waste metal is needed, and therefore it is secondary.

The profit from the sale of the final product manufactured from the commercial waste would be the greater the closer the quality and properties of the latter are to those which are required from the final item. This profit should be distributed logically among all those who created it (the producer of the commercial waste, the intermediary who performed the commodity and distribution operations, and the consumer who completed the processing of this waste up to the final item). All of them must be motivated. How? In our opinion, through a correctly determined price for the commercial waste.

It should be equal to the price of the prepared (commercial) product, adjusted (multiplied) by the coefficient of the utilization of resources during the manufacture of the commercial waste. The price of a unit of a commercial product is formed from the production cost, expenditures on transportation-warehouse and trade operations, and profit. The production cost takes into account expenditures of materials resources in terms of their prices and expenditure on the production of the product.

The coefficient of the utilization of resources is the ratio between the volume of resources actually expended on the production of a unit of commercial waste by the manufacturer and the planned expenditures of analogous resources for the technological process of manufacturing an item which is acceptable to the consumer of the commercial waste.

Let us clarify what has been said with examples. Let us assume that the purchaser needs commercial wastes from which it is possible to manufacture rectangular flanges. The following variants are possible:

- a) the amount of waste and its form are inadequate for the manufacture of the flange. The transaction does not take place;
- b) the size, form and qualitative characteristics of the waste fully coincide with those that are required according to the blueprint of the phlange. Actually, the consumer acquires from the salesman not waste, but a standard commercial product (prepared phlange). Therefore its price should correspond to the price list or should be calculated as a contractual price. In this case the coefficient of the utilization of resources is equal to 1, and the price of the commodity includes the cost of all the utilized resources;
- c) the size of the scrap of metal makes it possible to manufacture the necessary phlange, but their shapes do not coincide or they only coincide partially. It is necessary to make additional expenditures on completing the processing. It must be established which quantity and which resources have already been expended by the salesman of the commercial waste and how much must be extended in the process of completing the work.

If the shapes do not coincide, the useful expenditures of resources can be reduced to only those expenditures for separating the standard sheet of material from the part from which the phlanges will be cut or stamped. In this case the ratio between the actual expenditures on the material and the planned expenditures as determined on the basis of normatives that pertain to the first cutting operation by the purchaser of the commercial waste, since further processing of the blank must be done according to traditional technology. Since the actual expenditures of material make it possible to manufacture the phlange (otherwise we would go back to variant (a) and the transaction would not take place), this ratio of expenditures can be taken as equal to one (everything that is more than this can be left out of the calculation since the leftovers from the cutting will not be put to use).

As a result, the price of the commercial waste will be equal to the price of the metal (material) plus the value of other resources expended on separating a unit of the sheet into parts that are convenient for production. Information about the quantity of these resources, their value and, consequently, their price can be extracted directly from the technological normatives that are in effect for the consumer of the commercial waste.

In the event that the shapes coincide partially, in order to calculate the actual expenditures of resources on the creation of the coinciding elements of the shape of the scrap and the phlange, it is also necessary to determine the proportional expenditures of resources per unit of length of the perimeter of the shape of the phlange and to multiply these by the length of the coinciding sections of this shape. These calculations are done on the basis of technological normatives that are in effect for the consumer and the values of standard adduced expenditures as indicated in the reference book, (see, for example: "Calculations of the Economic Effectiveness of New Technical Equipment. Referenced," ed. K. N. Vyalikanov, Leningrad, Mashinostroyeniye, 1975).

Similar business transactions with the contractual price are effective only with stable production when one knows precisely what is purchase and for what,

what will be produced from this and how much. In other words, this is the usual process of determining the economic effectiveness of production. The only difference is that with this approach it is advantageous for the salesman to maximally complete the processing of the commercial waste and sell it at its full price, and it is advantageous for the consumer to purchase commercial waste that is close in its qualities to the final product at a price that is in any case lower than the cost of the production itself.

The profit formed in the process of salvaging metal scraps (commercial wastes) is distributed among all participants in the process of collection, final processing, distribution and production utilization of wastes, that is, among the salesmen, intermediary and purchaser of the commercial wastes. The profit for the salesman is determined as the difference between the price of the commercial waste and its production cost, including expenditures on completion of the processing. The intermediary--the supply organization--receives from the salesman (supplier) of the commercial wastes part of the profit in the form of payments for acting as middlemen in the sale of substandard metal. For the purchaser of the commercial wastes the profit is the difference between the production costs of the items from standard metal and from commercial wastes which have already been prepared for consumption but have a lower price than that of standard materials. There is no doubt that the sale of these wastes should be taken into account in the sales plan.

The basis of the material remuneration of the workers who gather, store, complete the technological processing and dispatch the commercial wastes, in our opinion, should be approximately half of the profit received from the sale of these wastes at prices agreed upon with the consumers. The amount of the material incentive fund should be directly proportional to the earnings from the sale of wastes at these prices and inversely proportional to the expended resources.

Workers of the Metallosnabsbyt Administration also make certain expenditures in announcing free residuals and establishing direct ties between the suppliers and the consumers of commercial wastes. In the future the creation of specialized regional centers for preparing metal products for consumption will make it possible for the intermediary to increase the share of his participation in the completion of the processing and the utilization of commercial metal scraps.

In order to stimulate this activity, the suppliers of these scraps should turn over a certain amount of the profit to Metallosnabsbyt in the form of payment for mediation in the sale of substandard metal scraps to outside recipients. It would be well to stipulate the amounts of the payment ahead of time (this could be a firm rate in rubles or a percentage of the profit obtained by the owner from the sale of the metal scraps).

Because of the reduction of the volume of released scrap metal and wastes of ferrous and nonferrous metals by enterprises in the Vtorchermet Association, the volumes of processing of secondary resources will decrease and, consequently, the bonus fund will also decrease. In order to reduce the influence of such phenomena, the enterprises of these associations can take on the role of intermediaries (similar to Metallosnabsbyt), dividing among

themselves the list of services rendered for preparing commercial metal wastes for consumption. For example, enterprises of Vtorchermet, following the example of their colleagues from Leningrad and Tula, can organize the processing of shavings into powder or their extrusion into profiled rolled metal. Other technological solutions are also possible. As a result, they will receive the right to part of the profit from the sale of the commercial wastes, which will reimburse them for the bonuses they have not received. Moreover, since the release of scrapmetal and metal wastes by these associations is decreasing, the higher organizations are obliged to reduce or stabilize the plans for the release of scrap metal by enterprises that supply commercial wastes.

The basis for the formation of the material incentive fund for workers employed in the processing of intraplant commercial metal wastes or those received from the outside through orders from Metallosnabsbyt is composed of deductions from profit obtained from the sale of commercial products and, in particular, consumer goods. In keeping with the instructions of the USSR Ministry of Finance, for each kind of item with profitability (in terms of production expenditures) of up to 25 percent, all the profit from the sale of goods and items is deducted in the material incentive fund. When the profitability of the goods is more than 25 percent the deductions are half the amount of the profit.

The proposed system of material incentives for the level of utilization of commercial metal wastes, in our opinion, makes it possible:

to increase the interest of all participants in this process in expanding the scale of collection, sorting, storage, technological preparation, distribution and salvaging of metal wastes;

to provide conditions for maximum savings and efficient utilization of all resources;

to increase the effectiveness of production;

to reduce the production cost of products and regulate third prices.

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WAYS OF HANDLING CONFLICTS RELATED

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[Article by N. V. Grishina, candidate of psychological sciences, Leningrad Institute of Rail Transportation Engineers: "What To Do With Conflicts?"]

[Text] For many people, the very word "conflict" evokes unfavorable associations more than anything else. The deterioration of relations, difficult experiences, the need to defend one's rights, and so forth. In spite of all our dislike of conflicts and despite our desire to avoid them, is is a rare person who can say that he has never had to encounter conflicts.

As the concerns the manager, he turns out to be involved in one way or another in every serious conflict in the collective.

Conflicts in the collective are not such a rare phenomenon, and this means that each manager is faced to one degree or another with the task of controlling conflicts, including analyzing the situations, making decisions, and conducting negotiations with participants in the conflict.

In order to formulate the basic principles of an approach which will enable us to "work" effectively with conflicts, it is necessary to answer at least a couple of major questions. How do situations of conflict arise in the labor collectives? Is it possible to avoid their negative consequences? How do we select a correct line of behavior in a conflict? What does its outcome depend on? It is impossible to answer all these questions in a single article. Our task is to outline at least a couple of principles for a practical approach to solving the problem of controlling the phenomena of conflicts in the collectives.

Something About the Nature of Conflicts

In general form it is possible to single out two aspects of the appearance of conflicts--the objective and the subjective or "human" sides.

The objective basis in the appearance of conflicts is linked to a complex, contradictory situation in which people find themselves.¹ Poor organization and conditions for labor, inefficient division of functions and

responsibility--these problems are among the ones which can potentially general conflicts, that is, they are objectively the possible soil on which strained situations can easily arise. If people are placed in these conditions, regardless of their mood, nature, relations developing in the collective and our appeals to mutual understanding and restraint. The probability of the appearance of conflicts is fairly high. Thus when conducting research in one of the production associations we encountered an inadequate determination of the rights of the workers in the technical control divisions of a number of shops. This led to chronic tension in the relations among workers of the shops and workers of the technical control divisions, on which there was regular pressure. It is noteworthy that these interrelations were not regulated for years, and the conflicts were equally prolonged. The objective nature of this situation of conflict is confirmed again by the fact that the workers of the technical control division, like the workers in the shops, changed during these years, but the conflict remained. Regardless of the concrete peculiarities of the people involved in it, the essence of the conflict was total determined by that contradictory situation in which the participants found themselves. It should be said that situations where the objective generation of conflicts can be clearly seen appear fairly frequently in actual production practice. The distribution of vacations is not made public enough, schedules for distributing them are violated--and conflicts arise. The changeover of the collective to brigade forms of work has not been prepared for, their principles are violated--and there can easily be conflicts and difficulties with the management, and also difficulties in the relations among the workers themselves.

Conflicts caused by such factors can be eliminated only by changing the objective situation. In these cases the conflicts perform a kind of signaling function by pointing out something unfavorable in the life activity of the collective.

Specialists think that in individual cases the existence of certain contradictions and tensions in the organization are good for the functioning. The sociologist A. I. Prigozhin, in his work devoted to problems of organization, gives an example of what he calls a "positive conflict." The head designer's division of the machine-building enterprises engages in constantly updating the products that are produced and searching for new and better technical solutions. This is the basic content of the division's activity and objectively it is interested in constant modernization and organization of production. But every innovation requires a corresponding restructuring of technological processes, time for adjustment and so forth. This is the concern of the division of the head technologist who, naturally, is not interested in particular changes and therefore serves as a kind of restraining force on the designers. By "hampering" one another, these divisions objectively, as a result of their "battles," raised each other's work to a higher level.² This example is not indisputable, but it is instructive.

Thus not all contradictions need to be "eliminated." They should be resolved in a positive way.

Now let us turn to the other side of the appearance of conflicts--the objective, "human" side.

Personal Peculiarities of the Conflicting Parties

Frequently concrete situations create certain kinds of obstacles on the path to satisfying our desires, wishes and interests. We put up with the many ways in which our plans diverge from reality, thinking this to be natural and inevitable. The problem begins when these barriers evoke protest in us: a decision that has been made seems erroneous, the behavior of one of our colleagues is unacceptable, the evaluation of our labor is incorrect, and so forth.

In the institute it was decided to begin research work on a new, future-oriented subject. During the course of the preliminary discussions with the management of the institute the head of one of the laboratories insisted on including this subject matter in the work plan of precisely his laboratory, that there did not seem to be any objections to this. But the final decision was made in favor of another laboratory. If the manager, having analyzed the situation, came to the conclusion that there was a basis for such a decision and that the cause would not suffer, but gain from this, he would evaluate the decision that was made as substantiated and no conflict would arise. But if he thinks that the decision is incorrect, that it was made out of some unclear or unbusinesslike considerations, the situation will become a conflict for him.

The beginning of a conflict, as a rule, is related to the fact that a person tries to prove his point of view and gives arguments in favor of his position, persuading the opponent.

Who is this opponent? A concrete person or--more rarely--a group of people whose actions have created circumstances which cause a reaction of protest: the manager who has made the corresponding decision, the worker who has let down his comrades, and so forth. The opponent can also be a person on whom the person who enters the conflict places responsibility for the situation that has been created even though the measure of his "guilt" is problematical.

A manager frequently encounters conflicts of this type when a subordinate makes a complaint to him about some circumstances that do not satisfy him: poor working conditions, the impossibility of obtaining a vacation at a convenient time, the lack of prospects for promotion, and so forth. In such a situation the manager frequently has a responsive reaction of protest which is related to the fact that the discussions about circumstances over which he has no control and he considers the complaints of the subordinate to be unjustified. One should keep in mind, however, that in the eyes of his subordinates the manager is not only a concrete individual in a concrete work position, but also a representative of the entire administration. This is precisely why he acts for his subordinates as an individual who bears responsibility for the labor situation as a whole.

In turn, the manager also because of a situation that does not satisfy him--poor work of the collective, an unhealthy atmosphere--frequently places the

responsibility on one of his subordinates (he is the one who is "stirring up trouble!"), seeing in him a source of problems, which determines his behavior and actions in dealing with this person, although, possibly, even removing him from the collective would not change the situation.

Conflicts of this type of situation potentially fraught with serious complications since the opponent perceives the complaints made against him as unjustified accusations and this evokes in him a responsive reaction of conflict. In their extreme, situations of this type can remind one of a search for a "scapegoat" in which a person who has fallen into a situation that is difficult for him realizes his experiences involved in this by "venting his anger" on the first person who gets in his way.

It should be emphasized that in the majority of cases the person first tries to resolve the situation that has arisen "peacefully." The ability to resolve a difficult situation without bringing it to the point of being a conflict is a sign of the individual's sociopsychological culture. On the other hand, in a complicated situation purely personal acts that are unfavorable can frequently aggravate it and cause a conflict.

Among these personal peculiarities which complicate the regulation of difficult situations and contribute to turning the interaction into a situation of conflict are the inclination to insist on having their own way without taking into account the opinions of others, categorical and irrevocable judgments, impulsiveness, lack of thought about words and deeds, the inclination to accuse a partner, the attribution to him of evil inventions and perfidious motives....

A couple of years ago I had occasion to conduct a psychological investigation of female workers who had an expressed inclination to conflicting behavior (in the opinion of experts who were in contact with them and knew them well, these workers found it difficult to communicate, they frequently engaged in conflicts, it was difficult for them to agree with one another and so forth) and--in opposition to them--those who were characterized by those around them in the most favorable way.

One can presume that people with a favorable style of communication inherently are inclined to avoid situations of conflicts, that they are more ready to make concessions, and so forth. Nothing of the kind. They too entered into situations of conflict, discovered their divergences and differences, with others, clarified their relations and so forth. But in one thing they differed distinctly from those who were "disposed to conflict": in a complex situation of conflicting interests, they were inclined to resolve the situation not taking only their own interests into account, but also the interests of the partner, and they strove to find a solution which--as much as possible--would satisfy the interests of both parties. And those who were "disposed to conflict" in difficult situations exhibited a marked inclination to resolve the situation only in their favor, and at any price, neglecting the interests of the partner.

From this example one can see well that the problem is not in avoiding any contradictions, differences of opinion or conflicting points of view (this is

apparently impossible) and not in fleeing from contradictions, but in the ability to behave correctly in a situation of conflict.

The skills of analyzing complicated situations and working out solutions presupposes a certain level of sociopsychological culture on the part of the manager. Research shows that orientation of the manager exclusively toward the production aspects and neglect of the sphere of interpersonal relations lead to dissatisfaction and tension in his relations with subordinates. This not only complicates the process of managing the collective but can also become a cause of serious psychological problems for the manager himself. A low level of psychological competence is frequently the reason for inadequate behavior and leads to "increased stress vulnerability" of the managers.

What does it mean to be psychologically prepared for controlling conflicting phenomena in the collective? First of all this means readiness to find a constructive solution to conflicts. It includes the skills of analyzing the situation, controlling its development, predicting the consequences, making the optimal decision, eliminating the negative consequences and, as much as possible, taking advantage of its positive effect.

A Couple of Models of Conflicts

And so it is not a matter of avoiding conflicts, but resolving them effectively.

Let us try to trace how on the basis of one and the same situation it is possible to develop various conflict models.

Changes in the technical-technological process in the shop led to a situation where, in the opinion of the shop chief, the existence of one of the sections as an independent subdivision had become inexpedient. At one of the conferences the idea was brought up of merging a small section with another one which was connected by the technological line. But its chief categorically objected to this, stating that this kind of unification was in no way justified from the technical-organizational standpoint, that it would have a negative effect on product quality, and that it would lead to a reduction of labor productivity, a complication of the situation in his section and a deterioration of relations among people.

Two points of view came into conflict. Is it possible on the basis of this to predict the development of the situation and its consequences? To answer this question we must look to other constituent parts of the conflict situation in addition to the immediate causes of the conflict.

The principal things of the conflict are such purely psychological aspects as the perception of the situation by its participants, their attitude toward it, and the strategies of their behavior. These are precisely what lead to a point where on the basis of one and the same reasons conflicts arise which are quite different in psychological types, which have different models of development and different consequences for their participants. Let us look at concrete examples to see how the aforementioned psychological characteristics vary in various types of conflicts.

Model 1.
The Business Dispute

In situations of this type the participants have differences of opinion regarding some particular issue, as a rule, a concrete one which is related to their joint activity. This can be a conflict of viewpoints about which technical or organizational decision is the best, how to implement a decision that has been made, what is the optimal sequence of organizational actions, and so forth. In one way or another the area of disagreement is concrete and determined. The "opponents" believe in the possibility of reaching an agreement and search for ways of achieving it. Their communication becomes intense, they discuss the situation, the merits and shortcomings of both points of view, using arguments they try to justify their position for the partner. Benevolence is typical of the relations among the participants in the situation and elements of favorable personal relations are retained. On the whole their interaction can be described as comradely, based on mutual interests.

If the situation of disagreement between the shop chief and the section chief which we related above were to develop in keeping with this scheme this would mean that they would make the subject of their "struggle" a concrete circumstance which brought about disagreement--the decision concerning the expediency or inexpediency of merging the two sections, without transferring these disagreements to other aspects of their work. One could hope that in this situation actually the best of the proposed solutions would be adopted or a third variant would be found which satisfies both sides.

Model 2.
Formalization of Relations

Situations of conflict that are developing according to this scheme is typical to have an increase in the zone of disagreements, and they do not relate to any one particular questions, but spread to a broader group of issues. Thus complaints can be made about the basis of the business policy that is conducted by one of the participants in the situation, the overall style of his behavior, interactions with members of the collective, and so forth. When coming to a recognition of this broad group of disagreements that exist among them (even if this recognition is not expressed and open in nature and has arisen not as a result of preliminary discussions but simply as a result of internal conviction), the opponents, as a rule, doubt the possibilities of reaching an agreement and sometimes simply do not wish to discuss issues that are in dispute. But in the event of the necessity to adopt some solution (for example, the selection of two alternatives that have been presented) they strive to turn to some external, official means of deciding ("how the management decides," "let the members of the collective decide"). If one of the opponents is higher in position he takes advantage of the rights he has been given for making a final decision. The interaction among the participants in the situation is no longer of the nature of camaraderie; it is more likely to be characterized simply as a partnership in which the people are joined together simply by their job interactions.

How will events develop in the sample of the situation we selected according to this scheme? Having revealed the disagreements among themselves regarding a concrete issue of reorganization in the shop, participants in the situation can, instead of limiting the zone of their disagreements, on the contrary, move in the direction of expanding it, that is, they will begin to make complaints against each other regarding other aspects of their interaction ("I have repeatedly been convinced that without even looking into what is going on you will immediately enter into an argument".... "You always make a decision without consulting anybody".... "It is easy for you to make decisions, but other people have to carry them out".... "It is easy for you to refuse, you do not have to make the decision"....and so forth). The discussion shifts to the style of work, past mistakes are recalled, there are even personal attacks which rapidly lead participants in the dispute to the conviction that they will not be able to change each other's position. When coming to this point the partners can refuse to discuss the problems that have arisen, having selected official methods of decision-making ("You are the management, you can see more clearly," "I see that we will never reach an agreement, so therefore consider this to be an order," one we have found a common language let the collective decide"). Having rejected the possibility of coming to a joint decision and stated their mutual disagreements and complaints as well as the impossibility of reaching an agreement, the partners, as a rule, do serious harm to their future relations. Their communication becomes purely official and they do not strive for contact; on the contrary they prefer to limit their communication as much as possible. Everything possible is removed from their interactions and therefore we have called this kind of development of a conflict situation the formalization of relations.

Model 3. Psychological Antagonism

When a situation of conflict among people develops according to such a type as "psychological antagonism" the real zone of disagreements among them is not limited, and there is a subjective tendency for it to increase. This means that the participants in the situation sometimes find it difficult to determine precisely wherein their disagreements lie, but they are clearly inclined to exaggerate them ("We cannot have anything in common".... "We are absolutely different people," and so forth). This is related to the fact that the relations between the "opponents" assume the form of mutual repulsion and any contact between them or object of discussion can be a source of disagreements. The opponents do not try to reach an agreement, and their communication is forced and consequently limited to the inevitable minimum. Psychologically the participants in the situation openly refuse to accept one another and attempts at interaction of one upon the other if they are made at all are more in the spirit of openly hostile actions than anything else.

If the chiefs of the shop and section had also in the past repeatedly discovered certain disagreements between themselves and if they had accumulated mutual complaints and offenses, if they relate to one another with caution and suspicion, a new conflict in points of view can undermine the basis of their relations. This requires only looking at the situation in a prejudiced way and each seeing in the other's behavior only an intention to do harm. Then the chief of the section will think that by his decision the chief

of the shop simply wants to get him fired, that he is "undermining" him, and that he thought all of this up only to create additional difficulties for him. and the chief of the shop also sees in the opposition of the section chief a reaction to him personally: "He opposes me in all my undertakings," "He is turning the collective against me," he is undermining me"....

Thus it is not the subject itself and not the fact of disagreements in a situation of conflict that turns out to be decisive, but rather the development of this situation, the character of the communications and the relations among its participants.

Analysis and Discussion

The significance which communication among the participants in a situation of conflict has for its outcome makes it understandable why many specialists think the central aspect of the conflict is the negotiation. During the course of negotiation they make precise the subject of the conflict, explain the positions of the participants, and lay the basis for resolving the situation of conflict. Successful negotiations can contribute to a rapid and optimal resolution of a conflict and, conversely, failures in conducting negotiations complicate the situation and increase the tension in the relations between the two sides.

On suggesting holding a conversation with his opponent, if the manager himself is one of the parties in the conflict, or with its participants if he is faced with the task of resolving a conflict among members of the collective, the manager must preliminarily, as completely as possible, analyze the situation that has been created. This is precisely why it is not recommended that they enter into a complicated discussion, resulting in a sudden resolution without preliminary preparation. A preliminary analysis of the situation is a necessary component of an effective discussion. It presupposes a clarification of who is a participant in the situation of conflict, whose interests are involved in the conflict and how, who was its initiator and what goal he pursued, what was the reaction of other members of the collective to the situation that was created, and so forth.³ In addition to clarifying the basic objective circumstances of the situation of conflict it is necessary to try to compile a unique psychological portrait of the participants in the conflict, that is, as much as possible to explain to them what peculiarities of their personalities and their characters have played a role in the conflict that has arisen, and what is generally typical of their behavior in the labor collective. This is necessary in order to find those "points" where the positions of the participants in the situation of conflict can be brought closer together in order to take into account their psychological peculiarities which can aggravate the conflict in an undesirable way.

Along with a general analysis of the situation and a sketch of the characters of its participants, a preliminary preparation for conducting a discussion with the participants in the conflict presupposes the formulation of the goal of the conversation and its basic outline. If the manager has not fully explained the positions of the parties, the goal of the conversation can be to clarify the positions of the opponents. If they are clear to him and he sees a constructive solution, the goal of the conversation can be the discussion of

the solution to the conflict that is proposed by the manager. The goal of the negotiations can also consist in eliminating the tension between participants in the conflict and creating a foundation for their further business cooperation in the future. One should not set all of one's goals at once: both to figure out the situation and immediately try to come to an agreement, to remove the tension and to resolve the situation. Such a "spur-of-the-moment" solution to the problem is possible only in relatively simple situations. The more complicated the conflict the more risky it is to try to solve all problems at once, for a solution that is not well thought out can cause serious harm in the situation that has arisen.

In the beginning of the conversation it is necessary to demonstrate to the participants one's kind and sincere desire to straighten out the situation and to understand those involved in it. If the manager immediately discloses his dissatisfaction with the problem that has arisen and his desire to eliminate it as quickly as possible, the participants in the conflict will not feel that he is interested in them and their problems and the conversation may not turn out well. It is useful at the beginning of the conversation to formulate its goal orally so as to give the conversation a more purposive nature (for example: "I would like to hear once again your viewpoints regarding the situation that has been created and those variants of a solution which you consider acceptable").

When conducting a conversation with participants in a conflict the manager should maintain control of the situation, that is, he should direct the course of the conversation in the necessary channel, in keeping with the goal that has been formulated for the conversation.

The Czechoslovakian scientist S. Kratokhvil has developed the so-called "technique of a constructive argument," which is directed toward having the participants in negotiations master effective devices for conducting them. A constructive style of the argument, in the author's opinion, is characterized by concreteness (the discussion of a concrete subject of conflict and a lack of generalizations, shifting the conversation over to other areas of interaction, reference to past relations which have nothing to do with the matter, failures and mistakes on the part of the partner); activity of both parties, their involvement in the situation and their interest in the discussion; a clear and frank presentation of their positions and attention to the position and conclusions of the other parties and a desire to understand them; observance of ethical principles in the behavior of the parties toward one another, the utilization of business arguments alone, the avoidance of everything that could be construed as a personal attack on the partner.

The negotiations should proceed dynamically. The complexity of the conversation and its emotional significance for the participants frequently are quick to elicit in them a kind of feeling of psychological fatigue. One should try to complete the conversation before any of the participants in the conversation begins to feel weighed down by it, even if this means postponing the completion of the discussion. This follows from the general requirement for the completion of negotiations which is associated with ending them on a positive note. The participant in the conversation should leave with a feeling of readiness for further contact. It is also important to make sure

to emphasize what has been achieved in the discussion (even if you have not managed to achieve your goal and on the whole you are not satisfied with the result) so that the participants in the conversation will feel that the negotiations have not been in vain ("I am glad that we talked; now I have a much better idea of your place in this situation"), and so forth. A sense of the fruitlessness of a conversation that has been held makes its participants pessimistic and creates in them negative attitudes concerning continuing the negotiations.

S. Kratokhvil suggests using the following criteria for evaluating the results of a dispute: the conversation should be considered a success if as a result of it: 1) the partners received some new information or clarified something in their view of the situation or the positions of the partners; 2) they manage to remove at least some of the tension in their relations and exhibit mutual good will; 3) they came to a greater mutual understanding and brought their positions closer together; 4) they were able to eliminate the problem and resolve the situation. Of course it is the last one that is the best result, but even any other of the outcomes is sufficient to consider the negotiations that have been conducted at least partially successfully. And as a result of the dispute the partners have not learned anything new, the tension among them has remained or even become stronger, and they feel their separation and the impossibility are a lack of desire to change the situation, then the negotiations should be given a negative evaluation.

And so an analysis of the situation, a well-thought-out selection of a line of behavior, and effective discussion of the situation with its participants can transform an incipient conflict into an instrument for effectively solving problems and searching for the best solution, and even a means of improving relations among people.

FOOTNOTES

1. See, for example, Nikiforov, V. S. and Skobeyev, K. M., "The Organizational Nature of Conflicts," EKO, No 10, 1981.
2. Prigozhin, A. I., "Sotsiologiya organizatsiy" [The Sociology of Organizations], Moscow, 1980, pp 52-53.
3. One can learn about certain possibilities of analyzing situations of conflict in the book by F. M. Borodkin and N. M. Koryak, "Vnimaniye: Konflikt!", Novosibirsk, 1984.

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WAYS OF IMPROVING PROPAGANDA WORK SUGGESTED

Novosibirsk EKONOMIKA I ORGANIZATSIIA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 5, May 86 pp 171-176

[Article by N. V. Marinenko, candidate of medical sciences, chief of the Laboratory for Propaganda and Training of the All-Union Central Scientific Research Institute for the Protection of Labor of the AUCCIU (Moscow): "Hitting the Nail on the Head"]

[Text] Under a poster with bright letters saying "Do Not Smoke!" sat a person and, as you may have guessed, he was smoking. And since this poster was not at a gas pump, but in a restaurant, he took special pleasure in his smoking. This example is worth bringing up because even the most correct appeals have an effect only when they are precisely appropriate for the place, time and nature of the contact with the person who reads them. The author, in particular, has repeatedly had occasion to see people smoking in a polyclinic where the entire situation contributes to denying oneself such pleasures. The posters which appeal to people to protect their health always evoke increased interest and thought here. The more so since there is usually plenty of time for contemplation while standing in line. The mention of the polyclinic in this case is not accidental: the appearance here is frequently preceded by a negligent attitude toward the warnings contained on many posters that are posted in plants, construction sites and laboratories--posters devoted to the protection of labor.

The abundance of posters is explained by the fact that they play far from a small role in a system of measures for preventing industrial injuries and industrial diseases. A poster can have an effect on a maximally broad audience. The brief expression of the drawing, photograph or appeal makes it especially accessible. Flexibility and diversity of subject matter, the great speed of manufacture and, finally, the low cost add to the advantages of this means of influencing people who frequently forget that saving people who are drowning is first and foremost the business of the drowning people themselves.

The posters are not always taken seriously. Strange as it may seem, this is explained by the higher level of education: an educated person takes an ironic view of hackneyed appeals, impersonal, grey posters whose quantity clearly prevails over their quality. Posters saying "Noise is Harmful" which are posted in shops filled with roaring machines are also irritating. The

appeal to wear noise-absorbing earflaps is interpreted as a need to be oriented in the work of the mechanisms precisely toward their noise. Because of the inability to apply other methods, the administration hangs posters. But with their appearance the noise in the shop can only increase because of the comments from the people who read them.

What could increase the effectiveness of the posters? First and foremost centralization of their production, which would guarantee a high depictive and ideological level. Let us turn to the past. In the prewar years posters were initially handled by a special commission under the People's Commissariat of Labor and then by the Gosstrudizdat and the Izogiz. And when other publishing houses became interested in posters concerning the protection of labor, a permanent editorial board was created which discussed all sketches.

As soon as the poster became a mass phenomenon the possibility of selection appeared. During 1927 through 1931 alone in the country there were seven exhibitions of Soviet and foreign posters. A significant prize was established in the name of Mayakovskiy, which was awarded to the best poster of the year. And another tradition of those years was the keen social-educational direction of the posters. A nonproletarian attitude toward labor, drunkenness, absenteeism and negligence were censored more actively then than they are today.

Demands placed on posters concerning the protection of labor decreased, apparently, because of the elimination of centralized control over their production which took place as early as the 1930's. Instead of significant publications with their powerful aktiv of professional artists, the posters were composed by numerous independent shops which literally made their money on them. In 1958 the Presidium of the AUCCIU made the first attempt to return the production of posters concerning the protection of labor to at least some kind of order. In a special decree it was noted that such publishing houses as Mashgiz and Goskhimizdat completely ignored posters. Their lack of understanding of the importance of the matter led to an increasing transfer of money to the accounts of individual amateur shops that produce low-grade products.

At the same time measures were developed (only recommendations, unfortunately) which called for publishing posters through the strict control of the Moscow Institute for the Protection of Labor of the AUCCIU. It was to have "organized the work for generalizing the methods, forms and means of propaganda of the protection of labor and safety techniques." Since the proposal to organize someone's work was not compulsory for anyone, it was necessary to publish a couple of more decrees in order to get the matter off the ground.

Here also it was clarified that centralization is not a panacea. Collectives of artistic councils or of two or three publishing houses that were strongly joined together were willing to produce posters through the forces of the members of these councils and put a solid stop to the creativity of artists who did not have the good fortune to be included among the elect. This circumstance once again reminded people of the fact that any centralization should have a reasonable limit.

But it is better to centralize the control over the production of posters with extensive competition in suggestions and creative rivalry because the appeals which abundantly decorate the walls of the shops, in addition to their basic function, also develop taste and interest in art and aesthetics. And this problem is not resolved by the workshop method.

In order to present substantiation in proving the importance of the poster on technical safety, I shall give this example. Hanging a poster that said "Wash your hands before eating" in the shop dining room immediately increased the proportion of people who meet this simple hygienic requirement from 33 to 82 percent, which reduced the number of bulletins issued by an equivalent amount. The result, to be sure, could have been better if, instead of this poster, in the dining room shop under investigation they had installed additional wash basins as well....

We have now actually approached the matter of the effectiveness of the poster. And the time has come to say that the poster is one of the forms of advertising. Foreign practice is interesting. Advertising there is on a grand scale. In advertising abroad they extensively use the stage-by-stage system of influencing the psyche, where the first stage is attracting attention, the second one--manifesting interest, the third one--arousing a desire to acquire what is being offered, and fourth--inciting to action, that is, bringing the consumer to the point of making a purchase.

This ideal model can also be applied to posters concerning the protection of labor. And this being the case, why not determine its effectiveness according to the fourth stage--incitement to action directed toward safe work?

The preceding stages of this plan are no less important. How does one realize them? Attention is attracted through eloquence and originality of composition of the poster as well as its brevity. Interest in it is conditioned by a good knowledge of the person to whom the poster is addressed. The timeliness and innovation of the development of the theme are important and it is also useful to know the age, profession, qualifications, education and experience of the workers and to have information about the availability or absence of injuries in the past. Inciting a desire to work safely depends on the overall convincingness of the poster.

Questionnaires of workers in various productions are instructive. They considered the most interesting posters to be the ones that were shocking, with a large format, with bright, contrasting colors, based on simple schematic figures. Posters that elicit in the workers a feeling of guilt and point out the difficult consequences of failure to observe the rules of the protection of labor evoked unpleasant feelings--nobody likes to feel guilty.

In general increased aggressiveness with respect to the viewer and such strong arguments as the threat of death or injury bring about a blocking reaction of self-defense. Laughter upon seeing the horrors that threaten from a poster is essentially a manifestation of optimism in the face of death. In this case this optimism is clearly not to the benefit of the cause, and here humor as one of the manifestations of optimism essentially increases the effectiveness

of any appeal. Posters with comical drawings, according to the data from all investigations, are more popular.

In spite of the mass of methods for investigating the effectiveness of posters concerning the protection of labor and the differences in the results that were obtained, one can make certain recommendations, the more so since we have achieved the most insignificant successes in warnings against accidents.

The most important thing is to determine the idea of the poster clearly. Ideas can arbitrarily be divided into three types. The first is based on circumstances that elicit a positive attitude: here is how one should behave.

The second type is constructed on a demonstration of a negative fact and its consequences: here is what one should not do! The goal is reached through an awareness of the dangerous consequences of the failure to observe certain rules. In posters of this type the theme should be disclosed dramatically and satirically.

The third type of poster for protection of labor is constructed on a juxtaposition of a negative and a positive action.... The basic idea is thus expressed by showing a minimum of two actions and is characterized by tension and dynamism.

Artists are well aware of the requirements for composition of a poster: these include a combination of depictive, color and graphic elements which immediately indicate the center of meaning of the composition. An abstract manner in the style is undesirable in a poster if only because of its multiple meanings. The poster should take into account the perception of the worker and not of the art critic.

It is good, for example, when an image is laconic. But it is bad if the degree of generalization makes the depiction seem unreal. If it is also accompanied by hackneyed phrases then the symbol is transformed into a cliche to which nobody pays any attention.

It is good when the depiction is individual: it hits the target more precisely. But it is bad when the style of the poster is so individual that few people can understand it. This kind of art should be understood at the first glance. And its esthetic significance and the possibility of self-expression of the artist should not prevail over the functional purpose of the poster--the protection of labor.

It has been noted that posters depicting people and animals attract the attention more strongly than do those with inanimate subjects. It is known that appeals consisting of from three to six words are remembered better. It is easiest to take in a brief appealing text, for example: "Caution--Crossing." A text based on a well-known song or proverb is easy to understand: "Those shavings will hit the nail on the head--and put your eye out if you do not wear protective goggles." The poster should not be overloaded with words that carry no meaning. Therefore the appeal "protect your own specialized clothing" is meaningless because--let us be realistic--it is fairly difficult to protect someone else's specialized clothing. Official-

business phrases are also prohibited. Would it be interesting to read: "It is the duty of every working person to strictly observe the rules of technical safety"? For the most part nobody likes to be reminded of his duty. And therefore it is better to do without duties on the posters. The poster texts should also avoid negatives. The particle "not" evokes psychological resistance. As, incidentally, do the nonconcrete, impersonal words such as "It is prohibited," "It is dangerous," "It is necessary."

It is very expressive to change the usual word order so that the main semantic element of the text is emphasized ("You want to quit drinking?—Take a look at a drunk"). The same purpose is served by incomplete phrases: "Stop—Danger Zone" (The word "ahead" is automatically understood here) or interrupted sentences: "If you work at a great height...." (The drawing then shows a regular medical examination).

As we can see, the numerous restrictions makes composing the text for a poster a complicated matter which requires professional knowledge and experience.

The practice of human relations shows that nothing does less to make people act than an appeal "not to be stupid." The episode with the person smoking under the poster that said "Do not smoke" described at the beginning of the article again shows the correctness of this observation.

In this connection the author would especially like to look out the window of a car when it is decorated with the inscription "Do not lean out the window!" He was broken of the bad habit by the writing on an Odessa streetcar, which was composed precisely according to scientific recommendations: "Lean out! You will have a different view!...."

This same thesis also kept the author from preparing this article for a long time. But the sacred goal of protecting man's health helped him to get rid of his last doubts. Because, as was correctly stated in the text of one of the classical posters, "God created man, but did not create spare parts for him."

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BOOK ON STANDARDIZATION OF TERMINOLOGY REVIEWED

Novosibirsk EKONOMIKA I ORGANIZATSIIA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 5, May 86 pp 183-187

[Review by V. I. Tereshchenko, doctor of economic sciences (Kiev) of the book by I. N. Volkova, "Standartizatsiya nauchno-tehnicheskoy terminologii" [Standardization of Scientific and Technical Terminology], Moscow, "Standarty", 1984, 198 pp]

[Text] Without an unambiguous understanding of the terms, norms and rules today it is no longer possible to provide for a conjuncture of sciences, to automate information systems, to effectively introduce lastest scientific and technical achievements into production or to expand international scientific, social and commercial ties. The need for standardization of terminology has become exceptionally important.

A new science has appeared before our eyes in the world: the development of scientific and technical terminology. In the USSR D. S. Lotte is considered to be its originator. Before 1967 terminology was registered only in various dictionaries, while now it is included in state branch standards and appendices to them. It would be incorrect to think that standardization of scientific and technical terms amounts only to registering already existing concepts. It must reveal the dynamics of scientific knowledge and it must itself be dynamic.

The basic principles of standardization of terminology, the construction of classification systems, methods of selecting, analyzing and evaluating standardized terms and functions of various terminological services in the USSR, the policy for the development and coordination of terminological standards, methods of monitoring their observance and so forth are all information found in this timely and interesting monograph by I. N. Volkova. She is the author of many works on terminology that are well-known to specialists.

The book provides a broad survey of standardization of terminology in the USSR and abroad during the past 15 years and a multitude of curious factual data. In particular, we learned that as of 1 January 1983 in our country there were more than 900 state and branch standards for terms and definitions; in the CEMA there are about 240 terminological standards and recommendations, and in

the International Organization for Standardization--more than 200. Within the framework of the program developed by UNESCO, UNISYST (World System of Terminology) an international center for terminology has been created--"Infoterm." An international association for terminology has been organized: "Termia." In the International Organization for Standardization there is a special commission: "TK 37-Terminology." As we can see, many representative organizations are dealing with this important problem.

In the book under review special attention is drawn to the chapters about modern term banks and their interaction. What brought about the appearance of these banks? With complete information about the already existing system of standardized terminology and its interconnection with other corresponding domestic and foreign standards it would hardly be possible to do a good job of developing new standards. The appearance of a system for controlling data bases and data banks "produced a revolution in the area of information systems,"¹ because of the possibility of their extensive application in various spheres of human activity: in industry and trade, when accounting for personnel and selling tickets, when publishing medical references, and so forth.

Terminological banks have become one of the means of structurally organizing these large and complicated systems. There are now more than 20 of them in the world (in the United States, France, the FRG, Great Britain, Canada, Sweden, the USSR and other countries). One of these banks (more than 130,000 terms) was created in the All-Union Scientific Research Institute of Technical Information, Classification and Coding (VNIIKI) in Moscow, the leading domestic institute in the area under consideration. The author of the book under discussion here participated actively in the creation of this bank.

I. N. Volkova analyzes various problems with standardization of scientific and technical terminology and with good argumentation sets before the corresponding specialists the most crucial problems which require immediate solutions. In our opinion, the book would only gain if it also paid attention to a no less crucial issue: standardization of terminology in the area of organization and management. But what is the point in listing what is not to be found in the monograph? "Everyone has his own axe to grind." The problem of standardization of terminology in the science of organization and management bothers the authors of these lines more than it does I. N. Volkova.

Ten years ago we conducted a selective investigation of the organizational-management structure and the applied terminology in 44 scientific research institutes of Kiev,² which is still timely to this day. The investigation showed that in seven institutes the largest subdivisions were sectors, which were then divided into divisions. In 35 institutes, conversely, the largest subdivisions were called divisions. In one such scientific research institute the organizational structure consisted only of laboratories, while in another there was a laboratory which consisted only of the chief, who was "not burdened" with subordinates. As a result of the different interpretations of the concepts of "sector" and "division" the number of people employed in sectors varied from 25 to 356, and in divisions--from 5 to 44.

It is time to start giving various structural units their names, irrespective of their size, the nature of their work and their position in the hierarchical structure of the given organization. This is the cause of the confusion in the chains of command, the distribution of functions and administrative responsibility. With this kind of confusion of concepts and terms, naturally, it is impossible to have a comparative analysis of the methods of management, organizational structures and distribution of functions among various levels of management.

Sometimes the managers are leary. Will the standardization of administrative terms not limit their freedom in arranging organizational structures and methods of controlling them? In our opinion, there is no danger of this. For clarity let us use an analogy with a chess game. In this case we should be speaking not about prescribing to the partners which moves to make but about which of them has called a knight a knight and made the corresponding move with it. We cannot allow for one of the players, thinking a knight is a rook, to make the move of a rook. It would seem that everything is simple. Unfortunately, something like confusing a "knight and a rook" can be observed now in the sphere of organization and management. Otherwise it would be impossible to have the situation revealed by the aforementioned investigation of Kiev Scientific Research Institutes, whereby one manager calls one thing a sector while another considers it a division, in one place divisions are parts of departments while in other places it is the opposite. Equally ambiguous is the interpretation of such concepts as "branch," "institute laboratory," or "at the institute." More examples like this could be given.

Disputes take up a good deal of time and effort and the sources of them frequently lie in the fact that those involved invest the terms they use with various content. Unfortunately, we sometimes forget the wise advice of Descartes: Define words and you will free the world of half of its misunderstandings.

The development of state terminological standards in the area of organization and management is a complicated and labor-intensive job, even if it is limited to the definition of only 100-150 basic concepts. For we are speaking not about compiling an ordinary terminological dictionary, but about developing terminological GOST's, which necessarily require interpretation of each of these concepts in a planned economy. Since the legal force of the law is stronger than that of the standard, any terminological GOST is not worth much if the definition given in it contradicts the interpretation that exists in legislation. Consequently it is necessary to check on all existing laws.

Further, it is necessary to keep in mind that in the appendices to the 26,000 existing technical GOST's (and sometimes in the texts of the GOST's themselves) definitions have already been given for certain concepts which we are suggesting be standardized. But these definitions have been developed by the most varies departments over the course of many years, they have not been coordinated, and sometimes they are even contradictory. Consequently, before submitting one definition or another for approval to the Gostandart it is necessary to reveal these contradictions by comparing data containing the

corresponding data bank of the VNIIKI. Nor can one ignore the experience accumulated in this area by the CEMA, UNESCO and the UN. All this requires a great deal of labor-intensive work.

It is fraught, in particular, with the following difficulties:

The first consists in that the science of organization and management lies at the juncture of technical, natural and social sciences. Skeptics doubt the possibility of terminological standardization in the humanitarian branches of human knowledge. They point out, for example, that the concept "normal rate of work" will inevitably differ under the conditions of capitalism and socialism.

In our opinion, Marxist-Leninist theory of cognition can serve as a basis for standardizing terminology in the human sciences (consequently, also in the area of the science of organization and management).

The second difficulty is of a purely psychological nature. The fact is that any attempt can be analyzed from the standpoint of the "programming" of the thinking of the person who suggests it. Let us say an engineer, an economist and a sociologist are discussing the question: What is effectiveness? The engineer, deliberately or not, thinks about the technical effectiveness, the economist relies on economic effectiveness, and the sociologist--social effectiveness. In our view, it would be preferable to use as a base not individual suggestions and opinions of individual scientists, but terms that are registered in legislation and existing GOST's, and also prevailing traditions. It is possible to reveal these tendencies through selective investigations similar to the investigation mentioned above of 44 scientific research institutes of Kiev. It is not important whether a division is called a part of a sector or vice versa; it is much more important that in the process of implementing various governmental decrees and orders both of these concepts are interpreted in the same way throughout the national economy.

The author of these lines has been "propagandizing" the idea of standardization of terminology in the area of organization and management for many years. Literally all departments which have had occasion to address this problem are interested in it. But in life it is most difficult to make a way for those ideas to which nobody objects: everyone supports them, but nobody wants to be involved in concrete work. Incidentally, let us stipulate: Because of the creative cooperation of the Institute of State and Law of the USSR Academy of Sciences, the VNIIKI and partially the Moscow State Historical Archive Institute, certain initial steps in the right direction have already been taken. But, unfortunately, the work has not been study for the past 3 years. And this is not surprising because this labor-intensive work can be done only if it is officially introduced into the subject matter of some institute and the necessary funds are allotted for it. It is impossible to carry out such projects as public work.

As the biblical myth says, the confusion of the tongues made it impossible to construct the Tower of Babel. The existing "confusion of languages" in the sphere of management is also inadmissible.

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